

# White Paper

December 2006

## P990i

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Sony Ericsson

# Preface

## Purpose of this document

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This White Paper will be published in several revisions as the phone is developed. Therefore, some of the headings and tables contain limited information. Additional information and facts will be forthcoming in later revisions.

The aim of this White Paper is to give the reader an understanding of the technology P990i uses and to show the main applications, functions and features of the phone.

This document is aimed at:

- Operators.
- Service providers.
- Software developers.
- Support engineers.
- Application developers.
- Retailers.
- IT decision makers.

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# Sony Ericsson Developer World

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On [www.SonyEricsson.com/developer](http://www.SonyEricsson.com/developer), developers will find documentation and tools such as phone White Papers, Developers Guidelines for different technologies, SDKs and relevant APIs. The Web site also contains discussion forums monitored by the Sony Ericsson Developer Support team, an extensive Knowledge Base, Tips and Tricks, example code and news.

Sony Ericsson also offers technical support services to professional developers. For more information about these professional services, visit the Sony Ericsson Developer World Web site.

## Document history

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Change history		
May 2006	Version R1A	First Release
June 2006	Version R2A	Second Release
July 2006	Version R3A	Update
August 2006	Version R4A	Cache update
September 2006	Version R5A	OTA and phone configurator sections updated.
November 2006	Version R6A	Third party application support list updated.
December 2006	Version R7A	Section Synchronization capacity added.



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# Product overview

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P990i is a phone which combines telephone and PDA functionality seamlessly. P990i is the ultimate business tool on the market today.

P990i gives users excellent efficiency and flexibility when using email, Internet/Intranet browsing and making video calls. P990i is your office in your pocket, giving you fast access to the information you need wherever you are. Wi-Fi is available in hot spots and on board selected air and train carriers.

With two integrated digital cameras (2 megapixel in the back, VGA in the front), you can conduct face-to-face video calls from your phone.

P990i uses multitasking to allow you to perform several actions at once, such as, talk and browse the Web, or download music and watch a video clip.

For PC synchronization or transferring files between the phone and a computer, the Desk Stand and a USB cable are provided in the kit.

# Key functions and features

Function or Feature	P990i support	Page
Operating system	Symbian OS™ V9.1 Platform, including OMA DRM and platform security.	54
MMI	UIQ 3.0.	55
Size	114 x 57 x 21 - 26 (body flip) mm.	65
Weight	155 g with battery and flip.	65
Screen	2.76" Large QVGA (240 x 320 pixels) touch screen with 262 k colours that supports landscape view for camera, video imaging and browsing.	65
Colour	Silver.	65
Processor	ARM9.	65
Talk time	9 hours GSM /3 Hours UMTS.	67
Stand-by time	400 hours.	67
Interaction	Using touch screen, 3 way Jog Dial and dedicated buttons.	12
WLAN	✓ 802.11b compliant. 11 Mbit/s.	36
3G	✓ UMTS, video and 3GPP streaming.	51
Bluetooth™ Wireless Technology	✓ 2.0, includes car handsfree profile.	38
Infrared	✓	40
USB	✓	40
UMTS	✓ E-GSM 900. GSM 1800, GSM 1900 and UMTS 2100.	-
Application memory	128 MB Flash, 64 MB RAM (60 MB end user data).	41
Camera	Integrated 2 megapixel camera with 2.5 times digital zoom, 18-bit colour depth, auto focus for still pictures, video clip recording and video calls.	26
Video Camera	VGA.	26
Video call	✓ application included which allows video calls and video conferencing via the built-in dual cameras.	18
Media player	✓ supports playback, streaming and playlists.	29
Activity menu	✓ Customisable top level menu giving rapid access to P990i features.	14

Upgradeable	✓ via the Sony Ericsson Update Service.	46
Data transfer speed	High speed 12 Mbps.	42
FM radio	✓	33
Browser	✓ Opera browser that supports frames and javascript™.	34
Push email	✓ prepared for Extended Systems, Intellisync, JP Mobile, Research In Motion (RIM)/BlackBerry, Seven, Smartner, and Visto.	23
Messaging	SMS, MMS, EMS and email.	24
Email Wizard	✓	22
Internet wizard	✓	45
PIM applications	Contacts, Calendar, Tasks, Notes, Sound recorder, Time and alarm clock, Stop watch, Converter, Calculator, and UTC support.	19
Business card scanner	✓	28
Multitasking	✓ allows several applications to be open at once.	14
Viewers	Microsoft® Excel, Word, Powerpoint®, and Adobe® PDF.	24
Editors	Microsoft® Word, Powerpoint®, and Excel.	24
Themes	Easy personalization of animated icons, screensavers, wallpaper and skins.	47
Speaker phone	✓	-
Memory stick™	✓ Memory Stick Duo™/PRO Duo™ slot for up to 8 GB removable memory. 64 MB supplied with P990i.	36
Flight mode	✓ includes the option to turn Wi-Fi on.	13
Local synchronization	✓ via SyncML.	42
Remote synchronization	✓ via SyncML.	42
Business telephony	✓ with SIP-signalling to server.	18
Games	Vijay Singh Pro Golf 2005™; Quadrapop.	33
Additional applications	RSS Reader; Music DJ™; PlayNow™.	33

# Controls and operation

## P990i overview



## Flip closed view

In flip closed P990i is used like a conventional mobile telephone. Some PDA functionality is also available for use. The Activity menu automatically appears on the screen once the phone has started. The Activity menu is available in both flip open and flip closed, it gives rapid access to commonly used phone features. See "Activity menu" on page 14 for more details.

The following applications can be used in flip closed:

- Phone functionality
- Call log
- Speed contacts
- Video phone functionality
- Cameras

- Messaging
- Media player
- FM radio
- Calendar
- Contacts
- Picture gallery
- Sound recorder
- Tasks
- Qudrapop
- Notes
- Stopwatch
- Timer

## Flight mode

GSM, Bluetooth™ connection or FM radio signals from a mobile phone may be harmful to the safe operation of an aircraft.

Flight mode is a special mode in which the phone does not transmit signals, but allows the user to browse, read and write information resident in the PDA part of the device. If a hotspot is available the user can also browse the Internet/Intranet, send and receive emails.

## Text entry

There are four text entry methods in flip closed:

- The keypad. Characters are selected by pressing the key until the required one is shown (multitap). Keypad text entry is supported for 20+ languages. Text can be entered using the keypad.
  - The QWERTY keyboard located below the screen.  
The enhanced QWERTY keyboard features navigation and TAB keys to help when filling in text fields. The new backlight evenly lights up the keyboard. 4 keyboard types supported.
  - The virtual keyboard located at the bottom of the screen.
  - Write directly on the screen using the stylus.
- Text options supported in flip closed are:
- Add symbol.
  - Input type (ABC, abs, Abc or 123).
  - Auto capitalization.
  - Multitap.
  - Predictive text input.
  - 1st language.
  - 2nd language (when predictive text is selected).
  - Spell word (when predictive text is selected).
  - My word (when predictive text is selected).
  - Word suggestion (when predictive text is selected).

## Flip open view

---

In flip open all of the P990i functionality can be accessed. The Activity menu automatically appears on the screen once the phone has started. The Activity menu is available in both flip open and flip closed, it gives rapid access to the phones features that are commonly used. See “Activity menu” on page 14 for more details.

## Text entry

The text options with the flip open are almost the same as with the flip closed with some exceptions. When you are editing text, you can use the Text options command to:

- Add symbol - launch the symbols and punctuation marks table.
- Auto capitalization - switch Auto capitalization on and off.

- Predictive text input - enable or disable Word complete and Next word prediction. When the Predictive text input is selected you can also select:
  - 1st language - change the language.
  - 2nd language - change the language.
  - My words - view the user dictionary where you can add, edit or delete words.

## Long press on spacebar

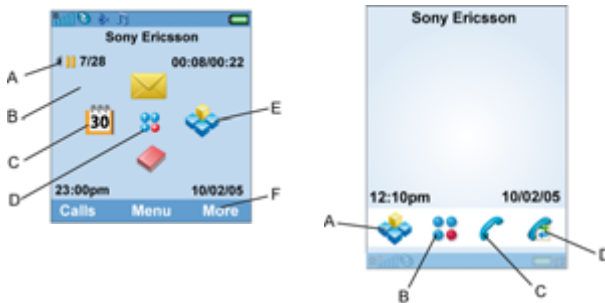
A long press on the hardware spacebar launches telephony functionality.

## User interface outline

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### Activity menu

Activity menu is displayed whenever you switch on your phone and is the starting point for performing a variety of tasks whether you are working with the flip closed or flip open.



Flip Closed

- A Network information
- B Messaging
- C Calendar
- D Main menu
- E Task manager
- F Soft keys

Flip Open

- A Task manager
- B Main menu
- C Phone keypad
- D Call log

The Activity menu is highly customisable, just about every aspect of its appearance, content, navigation methods and behaviour can be changed.

### Multitasking

It is possible to have several applications open and running on P990i at any time. An open application can either be closed, using the back key or simply left open.

To help keep track of the open applications the P990i has a Task Manager. When you open it a list of all the open applications is displayed. Choose to return to an open application or close it. Open application can be saved in their current state, so they can be retrieved later, without losing any data.

Editing features that move text from one application to another can be used.

# Models

---

There are four basic models of the P990i series phone:

## Standard P990i

- Europe, Middle East, Americas, Latin Asia
- Latin characters (a, b, c...) on the keyboard and numeric keypad
- Russian numeric keypad available
- Flip closed input by Zi-Corp and eZiText
- Latin character handwriting recognition

## P990a

- North and Latin America
- GSM 850 MHz
- Latin characters (a, b, c...) on the keyboard and numeric keypad
- Flip closed input by Zi-Corp and eZiText
- Latin character handwriting recognition

## P990i Chinese

- Hong Kong, Taiwan and Singapore
- Chinese keypads, Pinyin, Latin, BoPoMoFo and Strokes input method
- Latin, Strokes or BoPoMoFo characters on the keyboard
- Chinese handwriting recognition
- Chinese dictionary
- Lunar calendar

## P990c

- People's Republic of China
- Chinese keypad, Pinyin and Strokes input method
- Latin characters on the keyboard
- Chinese handwriting recognition
- Chinese dictionary
- Lunar calendar





# Technologies in detail

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This chapter offers a detailed description of the technologies available in this product. Encompassing a broad and rich range of functionality, the P990i facilitates basic functions such as calling as well as cutting edge developments found in entertainment, imaging and connectivity.

# Phone applications

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The following new call features are available in P990i:

- In call menu: P990i has a dynamic in call menu that changes to help the user perform actions quickly and simply.
- Accept Calls: users can specify which calls to accept and which calls to rejected.
- Rich call functionality: P990i allows SMS, MMS, and contact cards to be easily sent during a call.
- Call notes: P990i can launch Notes whilst a call is ongoing. The note is automatically named with the other party's number, name (if known), time of call and date. The user can start writing in the note immediately.
- Follow up call: P990i can automatically create follow up call tasks. The task contains the phone number, contact name, time of call, and date of call.
- Speakerphone.

## Video call

---

With the speed of UMTS and video call functionality, the P990i can be used to share news face-to-face with your business colleagues, family or friends. During a video call, the stream can be switch from the front VGA camera to the back megapixel camera. Use the megapixel camera to share images, such as scenery, with the video call recipient.

One of the camera feeds can be swapped to show a stored picture, allowing the callers reaction to be seen.

The camera can be set up to automatically switch on when you receive a call.

The VGA camera is mounted in portrait mode. Landscape video call images are produced from the portrait image feed by clipping the top and bottom of the portrait image. This affects the resolution of the VGA camera and causes a zooming effect.

## Business telephony

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Corporations have traditionally used fixed-line and DECT phones in the office, but now there is a strong trend towards the use of mobile phones to access business telephony features. Of prime importance, however, is that users can still access the features and functionality of their corporate communication system, no matter which phone they are using. The P990i can interact with the following corporate systems:

- A Corporate switch PABX, (Private Automatic Branch Exchange), equipped with a mobile extension port, (like the Ericsson MD110 and BusinessPhone).
- The mobile centrex service, if provided by the operator.
- Telephony server located at the operator's or customer's premises.

### Feature commands

The user activates corporate features by selecting commands from a list, which can be dynamically sent by the server via an IP link, or pre-configured by the company's IT manage, the operator or a service provider. Each command displays a text description of the function.

When a command is selected, pre-configured DTMF tones are used to communicate the desired function to the server. The phone can even be used to send data that the user is prompted to provide, such as the date they will be back from a business trip. Feature commands and text descriptions have to be programmed using XML and then imported into the phone.

In-call features are reached from the active call view.

Offline commands and corporate telephony settings can be accessed by pressing the 'corporate telephony' icon once a calling card has been set up. Activating a command will result in an IP packet being sent to the server.

## Routing of corporate calls

If a company uses a PABX, calls must be routed via the PABX to gain access to corporate features and resources. The P990i can route outgoing calls to the corporate switch, instead of to the dialled B-party. To complete a call, the B-number is then sent to the mobile extension port of the PABX and the call set-up is completed. This process is completely transparent to the user.

A user may dial either an internal number, such as, 1234, or a public number, like +468 123 4567. The P990i can be set to bypass the switch for certain types of calls.

## Configuring the phone for the company

The person responsible for the corporate communication services defines how the phone shall be configured. This may be the company's IT manager, the operator or a service provider. They define what feature commands shall be displayed in the phone, how these commands interact with the PABX and what text is displayed. They also define how P990i should handle calls to and from the corporate switch. This is all done in an XML-structured configuration file, with the extension .pbx. Once created, this configuration file can be easily installed onto the P990i.

To ensure that only authorized personnel have access to the PABX, approved mobile phone numbers are added to the list of mobile extensions in the PBX, and only these numbers will be able to use the facilities available.

For more information please go to [www.sonyericsson.com/professionalsolutions](http://www.sonyericsson.com/professionalsolutions) and look for "Areas of use".

# PIM applications

---

The 60 MB storage space designed for user data is where the PIM applications data is stored. As this is a dynamic memory it is impossible to state which number of contacts, email messages, and so on that can be stored in this part of the memory. For example, fewer email messages make room for more contacts.

From the perspective of synchronization performance, however, there are requirements (which the phone meets). See "Synchronization capacity" on page 44 for more information.

## Contacts

---

P990i Contacts application holds the details of all the user's contacts. It is available in flip open and flip closed modes and is fully integrated with the

phone and other PIM applications. Each contact can contain multiple phone numbers and email addresses, names, addresses, birthday details,

anniversary details, personal notes and a picture or photograph. Most of this information will typically be transferred to P990i when it is synchronized with a PC application such as Microsoft® Outlook® or Lotus Notes. Contact data can also be added and edited on P990i. Local and remote synchronization is possible using the SyncML standard; see “Synchronization and data transfer” on page 42 for more information.

Data can also be beamed to and from P990i using infrared and Bluetooth™ connectivity. It can also be sent and received using Messages. See “Object exchange - 'send as'” on page 45 for more details.

Contacts are displayed in a list, which may be filtered by folder such as business or personal. To see a contacts details select the contact. Tap the

icons alongside the contacts details to launch a video call, phone call, a new message or a URL in the browser.

When a new contact entry is created the camera can be launched from within the application allowing you to take a picture of the contact. Alternatively an image from the Picture Gallery. can be selected.

Calls received from new numbers can automatically cause the user to be prompted to save the number.

Contact details can be added to a distribution list. Distribution lists can be used to send groups of contacts the same email, SMS, EMS or MMS.

## Calendar

---

The Calendar application keeps track of appointments and events and enables reminder alarms to be set. The calendar view has been enhanced to display the selected day's events on the screen.

Calendar entries are displayed in local time, but all appointments and reminders are saved in UTC (Coordinated Universal Time). If the user moves to a different time zone the calendar updates the appointments and reminders automatically. Meet-

ing requests can be sent from the Calendar application via email. Meeting invitations can be received by email and added in to Calendar.

The alarm signal can be personalized using sound clips. Appointments can be shared using infrared, Bluetooth™ connectivity, and also by Messages. Local and remote synchronization are both supported using SyncML; see “Synchronization and data transfer” on page 42 for more information. The Chinese models support the lunar calendar.

## Tasks

---

Tasks is a simple yet powerful application that can be used to make reminder notes. Task items may be beamed, exchanged using Messages, synchro-

nized locally, and remotely using SyncML, see “Synchronization and data transfer” on page 42 for more information.

## Notes

---

Notes provides a quick means of making notes in either text or sketch format. Notes can be launched during a call. The note is automatically named with

the other party's number, name (if known), time of call and date.

## Time and alarm clock

---

Time is a sophisticated alarm clock, which can show the time both locally and in another time zone. If the user swaps the local time zone to the other specified time zone the local time zone is automatically displayed in the second time zone area. Alarms can be set. The alarm signal can be

the FM radio or any supported sound that is stored on the phone or inserted Memory Stick™. If you set the alarm to a time when P990i is in Flight Mode the radio is unable to launch due to restrictions so a predefined tone is used instead.

## Sound recorder

---

Sound recorder is a simple screen-driven dictation machine with the added advantage that recordings can be beamed and exchanged via Messages. Sound recorder can playback any recordings made on the phone.

- Record a personal ringtone.
- Add a new recording to an existing one.
- Rename recordings.
- Save recording to the phone or Memory Stick™.
- Delete recordings

Sound recorder can also:

## Calculator

---

Calculator has the features of a standard desk calculator, and is always available from the application launcher.

## Stopwatch

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Stopwatch can be instantly started and stopped to measure an exact duration of time. The stopwatch continues to run when a call is answered. The stopwatch can run in the background if the application

is closed, an icon is displayed in the status bar to show that it is running. You can time and record up to 9 events.

## Converter

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Converter helps you to convert the following measurements; Distances, Volumes, Weights, Temperatures, Speeds Areas and Currencies.

## Speed dial

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In flip open or flip closed the user can launch the following features from picture speed dial:

- A call.
- A video call.
- The entry in contacts.

## Messaging

---

### Email

---

P990i supports the following standards:

POP3	POP is used to retrieve and delete messages from an incoming mail server in the network
IMAP4	IMAP is also used to copy, retrieve, move and delete messages from an incoming mail server. IMAP has more features than POP such as remote folders. IMAP4 also offers support for the IDLE command, which if supported by the server, offers push capabilities.
SMTP	SMTP is used to send messages from a mail client to a mail server.
MIME	MIME is a format that describes data, such as, defining the attachments included in email.

Most of the standards above are supported by Internet Service Providers and many corporate environments. P990i is supplied with an Internet wizard which helps users to configure an account. OTA (Over The Air) configuration of email and ISP accounts is supported.

P990i supports SSL and TLS encryption.

Automatic polling can be used so that email is automatically collected and presented in the Inbox. Controls are provided to filter messages based on size, enabling cost and download time to be managed.

Another option enables only email headers to be presented in the inbox. Headers are quick to download. The user may read and select headers and request the message to be downloaded if necessary.

If IMAP4 is used you can enable the IDLE command to keep connected to the email server. This allows the server to push new messages directly to the P990i as they arrive.

Email transmission is performed in the background, making it possible to perform other messaging functions during transmission.

A list of recently used addresses are available when creating a message. P990i allows distribution lists to be created and sender ID information is sent with message alerts.

P990i can send any type of attachment, including the following:

- Pictures.
- Video clips.

- Audio files.
  - SIS files.
  - JAR/JAD files.
  - Themes.
  - vObjects (vCalendar, vCard, vNote, vBook-mark).
  - Files produced in the document editors.
- Attachments may be viewed using the pre installed viewers for Microsoft® Word, Excel, and Adobe® Acrobat® (PDF). See “Quickoffice®.” on page 24 for more information.

A signature may be set up so that essential details are automatically copied to the end of each outgoing email.

The supplied Sony Ericsson PC Suite enables email to be synchronized with Microsoft® Outlook® and Lotus® Notes®. During synchronization, new email from the PC is transferred in to the corresponding 'synchronized email account' inbox on P990i. Messages and replies written using this account on P990i are transferred and sent via the PC.

Web based email can, of course, be accessed using the P990i browser.

## Email folders

Messaging accounts have the following folders: Inbox, Outbox, Draft and Sent. You can create additional folders if you want, see Local folders below.

## Remote folders

IMAP4 accounts can subscribe to remote folders that are located on the server. Select subscribe from the folder menu.

## Local folders

To improve the organization of your folders you can create more folders locally on P990i. Local folders are only visible in the Messages application. Local folders cannot be created on the Memory Stick™.

# Push email

---

Push email is a method of 'pushing' or forwarding email to mobile devices as soon as a message reaches the email server. These solutions may also include calendar and contacts synchronization. Push email solutions allow email messages to be delivered in the background in the same way as SMS or MMS.

P990i is prepared for these solutions and a rich set of 3rd party applications are available from companies such as Extended Systems, Intellisync, JP Mobile, Research In Motion (RIM)/Blackberry, Active Sync, Seven, Smartner and Visto.

## Push methods

The solutions use different methods to push the messages, usually IP push, by listening to dedicated ports when a session is active, this is similar to instant messaging solutions. Some solutions may also use SMS with triggers to the application to start a sync/download, sometimes referred to as pseudo-push.

## Security

All solutions use end-to-end security using SSL, 3DES or AES encryption. Most solutions are based on using a fixed password for push mail. Initially key exchange is also done by using device parameters such as the IMEI number. A few solutions combine push with one-time passwords that are limited for a certain amount of time before being re-entered. Many solutions have functionality for enforcing screen passwords. There is also sometimes theft and loss protection through wipe-out commands and lock-out.

## Unified mailbox

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SMS, EMS, MMS, Local Information, Beamed and Autoconfig messages are all stored within one unified inbox in messaging.

- **SMS (Short Message Service):** With SMS a user can send text messages containing up to 160 characters to and from GSM mobile stations (up to 70 characters using unicode text). P990i also provides concatenated SMS, that is, the user can write a longer message and P990i will automatically send it using more than one SMS. You can reply to an SMS with an MMS and send a fax using SMS as the bearer. There is enhanced support for delivery reports and short message class support.
- **Local Information, Automatic configuration items, beamed items** will be found in the Inbox.

- **Enhanced Messaging Service (EMS)** adds powerful functionality to the well-known SMS standard.

An EMS can include; sounds and melodies, pictures and animations and formatted text.

EMS message can be sent as concatenated messages.

- **MMS messages** may include combinations of video clips, animation, pictures, sound and text. The following tasks can be performed from an MMS; smart uploads and downloads, automatic transmission when leaving Flight Mode, record video directly from the MMS application, background transmission, direct links, these are customized shortcuts to operators Web site to get new templates and reply to an MMS with an SMS.

## Area Information

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Area information is SMS Cell Broadcasting.

An SMS cell broadcast allows information to be sent to all mobile phones in a particular geographic area. Information such as traffic news or local weather reports can be sent to an area covered by a single cell or to the entire network.

Broadcast messages are organised into a number of channels, this allows different types of messages to be broadcast on different channels. Using the phone, users can choose which broadcast channels to subscribe to. The requested text messages are received, the message either scrolls across the

standby screen or is placed in the Inbox. The user can choose if they want to save the message to the Inbox or not.

Broadcast subscriptions are controlled from the Area information dialog.

When a user is subscribed to channel 50 and this channel is supported by their network, the ID of the current cell (or group of cells) is displayed underneath the network operator name in the phone display. This is often the telephone area code or postal code of the current location.

## Quickoffice®

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Quickoffice® is an application that can be used to view and edit Microsoft Word, Excel, PowerPoint and text documents. It can also be used to create new documents and spreadsheets.

Quickoffice scans the P990i and displays a file manager which lists all compatible files (.xls, .doc, .ppt, and .txt) depending on where they are on the

phone (you can select to search the internal memory, Memory Stick, or email). The file manager view can be changed to only display files that are compatible with one of the support programs.



From the file manger you can delete, move or copy documents, create new documents, and open existing ones. You can also send documents using any of the methods available on the device (email, MMS, IR, Wi-Fi or Bluetooth™ connectivity).

Quick office is localised into English, Italian, German, French and Spanish

## Quickword®

Quickword allows you to view and edit word processing documents on P990i. You can use it to view and edit any of the thousands of texts available in the standard DOC format. PC format email attachments can be opened directly on the device without the need for conversion at a PC, edits to existing documents can be made even while preserving the file integrity.

Documents can be transferred to and from P990i using email, MMS, infrared, Bluetooth™ connectivity, Wi-Fi or a Memory Stick. Quickword opens files created with Microsoft Word 97, 2000, XP and 2003 that are saved in Microsoft .doc format.

When a document is opened for editing, a copy of the document is created so that the file is intact. When saving a file, Quickword creates a native Word file.

### Key Features

- Refined user interface for easier document editing and viewing.
- Multiple Undo and Redo commands including cut, copy, paste and formatting functions.
- View tables embedded within documents and edit the text (\*tables are displayed in a single column format for easier viewing on the P990i, actual table format of the document is not affected).
- MS Word compatible paragraph and style formatting.
- Advanced text formatting including superscripts and subscripts.
- Open, view, edit and create both .doc (MS Word) and .txt (text) files.
- Edit Word documents, and forward to colleagues just as you would from your desktop PC or laptop.
- ZoomView™ lets you pick the display size best for you.
- Quick navigation through documents.

- Advanced formatting includes full font control including typeface, size, bold, italics and underline.
- Colour support and colour picker for changing font colours.
- Keyboard support for folding portable keyboards and on device text entry.
- Format paragraphs with left, center and right text justification.
- Portrait and landscape mode supported.
- Cut and paste text, undo edits, and more.
- Edit-protect mode prevents editing or making alterations while reviewing documents.

## Quicksheet®

Quicksheet is a full function spreadsheet with Microsoft Excel compatibility.

Quicksheet opens files created with Microsoft Excel 97, 2000, XP and 2003 and saves in Microsoft .xls format.

### Key Features

- Features the most frequently used scientific, financial, statistical, date & time, lookup and aggregate Excel functions and sorting.
- Multiple sheets per workbook and sheet linking.
- Advanced cell editing features that allow to you create and modify spreadsheets easily. Permits cell formatting in a number of different ways.
- Quickly sort data and lists.
- Find and Find/Replace functions.
- Cell and font colour formatting.
- Column resizing, row and column freezing.
- Portrait and landscape mode supported.
- Saves changes as a native Excel file that can be sent via IR beaming, Bluetooth, Wi-Fi, USB or email.

## Quickpoint™

QuickPoint allows you to view and edit Microsoft PowerPoint® presentations. The application is compatible with MS Office 97, 2000 and XP. It allows a variety of modes for viewing such as slide, notes and outline views.

### Key Features

- Edit slide text in Outline view and show the changes in the Slide View.
- Edit speaking notes.

- Edit PowerPoint presentations and forward to colleagues just as you would from your desktop PC or laptop.
- Advanced viewing includes three views:
  - Outline View;
  - Slide View;
  - Speaker Notes View.
- View & edit PowerPoint slides and notes.
- Zoom in and out.
- Portrait and landscape mode supported.
- Saves changes as a native PowerPoint file that can be sent via IR beaming, Bluetooth, Wi-Fi, USB or email.
- Give presentations right from your P990i with iGo® Pitch Duo™ display accessory or remotely control a PC.

## PDF+

Pdf+ is a viewer for Portable Document Format (or PDF) files. Pdf+ reads and displays standard PDF files, without the need for conversion on a PC to a proprietary format.

With Pdf+ you can:

- View the text, line drawings and bit maps in the document.
- Browse the document, and go to a specific page.
- Wrap the text to make it fit the screen.
- Zoom in and out to maximize the amount of text and graphics you can read on the screen.
- Hide the title and the status pane to maximize the viewing area.

- Search for strings in the text of the document.
- View and follow bookmarks.
- Follow links to other pages in the document.
- Follow URLs if you have the Web browser installed.
- Read files protected with a user password.
- Email PDF files to other people.
- Read PDF files that were sent to you as attachments.
- Manage your PDF files.

The 'wrap' view displays the document so that as much text as possible is visible on the screen. Images and line drawings are not visible in this view. Pdf+ can display a large number of PDF 1.0, 1.1, 1.2 and 1.3 files.

Limitations:

\*Pdf+ doesn't handle the dynamic content of a PDF file.

\*Pdf+ cannot render Type 0 and Type 3 fonts.

## Document types supported

Document type	Features
Adobe® Acrobat® (PDF)	Viewer
Microsoft® Excel	Editor
Microsoft® PowerPoint®	Editor
Microsoft® Word	Editor

# Camera

## 2 megapixel camera

With the integrated 2 megapixel camera, the user can take pictures and video clips and store them in the phone memory or on the Memory Stick™.

The megapixel quality gives excellent results when images are printed or viewed on a PC or TV.

Images can be sent as an attachment in an email or a picture message. The picture can also be sent via Wi-Fi, Bluetooth™ connectivity, video call, infrared or cable.

The still picture resolution can be set to:

- 1600 x 1200 (UXGA).

- 1280 x 960.
- 640 x 480 pixel (VGA).
- 320 x 240 (QVGA).

The image quality settings can be set to:

- Fine (low compression).
- Normal (medium compression).
- Economy (high compression).

All these resolutions provide an 18-bit colour depth (262 k colours).

It is possible to take still pictures and video clips in flip closed and flip open modes. When using the camera the viewfinder is displayed in landscape orientation. The camera has a photo light which acts as a flash, the flash can be manually enabled when required.

For close-up pictures, the camera has 2.5 x digital zoom.

### Auto focus

The camera has auto focus functionality. To operate auto focus the camera button is pressed half-way. The camera focuses on the image, a locked symbol is displayed in the viewfinder to indicate that the image is in focus. Press the camera button all the way to take the image or release it to change the camera position and re focus on the image. Auto focus can be turned off, if this is the case the image is taken immediately when the camera button is pressed.

### Burst mode

When taking a photo of an object that moves quickly, you can use burst mode to take four pictures in rapid succession. Burst mode takes pictures in VGA resolution.

### Macro mode

Macro is used for close-ups. The lens focuses on a much shorter distance, 10 - 50 cm in 28 steps.

## Using the camera and video

The camera and video can be started via the active lens cover, via the camera button or via the application menu.

## Recording video clips

When the camera application is running, the user can select video capture mode. Video clip capture quality can be set to:

### High - AAC-LC (sound = mono 8 KHz @ 12.2 kbps)

Frame size	Frame rate (FPS)	Bandwidth (kbps)
QVGA	15	384
QCIF	30	256
QQVGA	30	192
SQCIF	30	128

### Normal - AAC-LC (sound = mono 8 KHz @ 12.2 kbps)

Frame size	Frame rate (FPS)	Bandwidth (kbps)
QVGA	10	256
QCIF	15	128
QQVGA	15	96
SQCIF	24	96

### Low - AMR-NB (sound = mono 8 KHz @ 12.2 kbps)

Frame size	Frame rate (FPS)	Bandwidth (kbps)
QVGA	7.5	192
QCIF	7.5	64
QQVGA	10	64
SQCIF	15	64

## Video format

Video can be stored in the following formats:

- 3GPP for recording low quality video for use in MMS messages.
- MPEG-4 for recording normal and high quality video.

The quality of the P990i MPEG-4 video clips has been enhanced to allow clips to be shown on a full-sized TV screen running at 30 fps.

### **Auto-exposure control**

The camera has a full automatic exposure control that selects the optimal exposure needed to get an excellent picture.

### **Lighting adjustment**

The camera has built-in compensation for bright skies that automatically adjusts the brightness of landscape pictures. This avoids the dark and dull

images that automatic cameras sometimes give in difficult lighting situations. It is especially effective for outdoor photography on grey and cloudy days.

### **Photo light**

The camera has a high quality photo light to improve taking pictures in dark environments.

## **Business card scanner**

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It is possible to take a photo of a business card and then use the Business Card Reader application to scan the card. The scanned text can then be saved as a contact.

## **Picture Gallery**

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The Picture Gallery enables you to view, send and organize your photographs, this includes pictures taken by the built-in Camera and images loaded from elsewhere. The Picture Gallery supports a display mode of 262K colours with the following

image formats; JPEG, BMP, GIF (including animated), MBM, PNG, WBMP, MNG, SVG, ICO and WMF.

You can also launch the Picture Editor from the Picture Gallery.

## **Picture Editor**

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Using the Picture Editor, it is possible to crop, rotate, resize, edit and correct images.

You can use the editor to edit pictures directly in camera view mode or make corrective adjustment such as red eye removal or improve brightness levels.

The editor also includes fun layers, clip art and tools for drawing on the image using the stylus. Different pen sizes and colours are available, as well as a text tool for formatting and inserting text into the image.

When creating MMS messages, the Picture Editor can be used to edit JPEG, PNG, GIF and BMP images as well as for creating simple JPEG images. A simpler pixel editor is also available for creating and editing pictures for EMS messages.

# Entertainment/multimedia

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## Media player

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From the Media player the user can access four media functions:

- **Music**  
Select to access music tracks. Songs may be collected in numerous ways, including Internet download, file transfer from the PC and via the Memory Stick™.  
Music can be organize and listen to on the P990i. Music is grouped by Album, Artist and track in the music library. The Tracks view displays all the music available. Tracks can be added to the music library manually.
- **Video**  
Select to access video clips.
- **Radio**  
Select to launch the FM radio. See “FM radio” on page 33 for more details.
- **Online**  
Access saved bookmarks to music and video's.

The Media Player can be used in flip open and flip closed. Only the FM radio and Music applications are available for use in flip closed.

The Media player features an equalizer with predefined settings like MegaBass, Pop, Classical. It supports different audio and video formats, streaming, download and playback.

The Media player is intelligently aware of other applications in P990i, playback is paused when a telephone call is made or received.

You can play and pause the Media player from flip closed.

Any recording made on the phone can be played using the Media player.

### Playlists

One of the most central Media player features is the use of playlists. This feature allows users to create their own ‘collections’ of songs and gives easy access them. It is possible to create, sort or manage playlists using audio files that are stored on the Memory Stick or in the phone memory.

To avoid including ringtones in the music library you can specify content that should be excluded. Pre installed ringtones are already placed in a separate ringtone folder.

### Play modes

The Media player has two different play modes: shuffle and loop.

- **Shuffle** plays a randomly selected file from the current playlist. Played files are de-selected and not repeated.
- **Loop** restarts the playlist when the last item in the list is reached.

### DRM protection

In P990i the following types of DRM protection are used: FWL (forward lock), CD (Combined Delivery) and SD (Separate Delivery). All protection types can be applied on MP3, AAC and MPEG4 files. See “DRM” on page 46 for more details.

All protection types can be applied to all types of multimedia content such as audio, video, images and Java midlets.

### Ringtones

Ringtones can be played in the Media player. Any file in a supported audio format can be used as a ringtone as long the operator has not disabled that format for ringtone use.

Ringtones can be downloaded using PlayNow™ or created using MusicDJ™.

## Streaming

Media player content is streamed using RTSP (Real Time Streaming Protocol) session control according to 3GPP specification.

Audio support is AAC-LC and AMR-NB according to 3GPP.

3GPP specifies the following codecs:

- H.263 Profile 0 Level 10.
- MPEG-4 Visual Simple Profile Level 0-3.
- H263 Profile 3 Level 10.

P990i supports the codecs formats as well as:

- Real Audio.
- Real Audio Video.

## Media formats

### Audio formats

Format	Description
AAC-LC	Advanced Audio Coding. AAC is the latest audio coding standard, defined in the MPEG-2 standard and is used for high-quality audio compression. AAC provides higher quality than MP3 at the same bit rate, or for the same audio quality it uses a 30 per cent lower bit rate. It supports the coding of multichannel audio, with up to 48 main channels and 16 low-frequency channels. The AAC offers three different profiles to facilitate trade off between quality, memory and processing power requirements. They include: Main Profile (MP), Low Complexity (LC) and Scalable Sampling Rate (SSR). The Media player can play AAC-LC format audio which is encoded into an MPEG-4 file or stream. The Sound recorder use the AAC-LC format for recording.
AMR-NB	Adaptive Multi Rate. AMR-NB is a speech compression format that is highly optimized for the mobile environment, requiring as little as 4.75 Kbps bandwidth. AMR-NB is used to convey voice recordings in MMS, 3GPP video clips or streams. P990i records AMR using 12.2 Kbps with a sample rate of 8 kHz.
AU	Similar to WAV, this is an audio format commonly used in the Macintosh, Unix and Java™ worlds. It is not commonly used for content on mobile devices.
iMelody	A format commonly used for monophonic ringtones. (P990i ringtones can use up to 40 voices.)
MIDI	Musical Instrument Digital Interface. MIDI is not a recording of music, but a description which enables a local synthesizer to play the music from the instructions included in the MIDI file. Since a MIDI file only represents player information, it is far more concise than formats that store the sound directly. An advantage is very small file sizes. A disadvantage is the lack of specific sound control. MIDI is ideal for polyphonic ringtones. (P990i ringtones can use up to 40 voices.)
SP-MIDI	SP-MIDI stands for Scalable Polyphony MIDI. SP-MIDI is based on the MIDI format and adapted for mobile phones and other portable products. The objective is to secure interoperability between products with different sound capabilities.  Initial recommendations for using SP-MIDI in 3GPP™ applications are discussed in a separate document, <i>Scalable Polyphony MIDI Device 5-24 Note Profile for 3GPP™</i> .

MP3	MP3 is the file extension for MPEG audio layer 3. Layer 3 is one of three coding schemes (layer 1, layer 2 and layer 3) for the compression of audio signals. Layer 3 uses a very efficient compression method, removing all irrelevant parts of a sound signal that the human ear cannot perceive. The result is, CD digital audio (CDDA) is converted to MP3 with almost untouched quality, compressed by a factor of around 12. The high compression of audio in MP3 files makes them relatively small, though MP3 files can be created with different size and quality compromises. The small file size, together with the excellent sound quality, are the main reasons for the MP3-format's massive popularity when sharing music over the Internet.
RMF	Rich Music Format™. A file format developed by Beatnik combining the compact size of MIDI files with the high quality of sampled sound.
WAV	A wave file is identified by a file name extension of WAV (.wav). Used primarily in PCs, the wave file format has been accepted as a viable interchange medium for other computer platforms, such as Macintosh. This allows content developers to freely move audio files between platforms for processing. In addition to the uncompressed raw audio data, the wave file format stores information about the file's number of tracks (mono or stereo), sample rate, and bit depth.
XMF	Xtended Music Format XMF is a technology for collecting other music and sound resources, such as Standard MIDI Files, DLS instrument files, WAV or other digital audio files. XMF does not describe musical notes, notation, instrument sounds or audio recordings. Instead, it allows content creators a method to collect all those elements and put them in a single file. In the end, this means easier handling and more consistent predictable playback.
DLS	The DLS file format is used to store both the digital sound data and articulation parameters needed to create one or more 'instruments.' An instrument contains 'regions' which point to WAVE 'files' (samples) also embedded in the DLS file. Each region specifies a MIDI note and velocity range which will trigger the corresponding sound and also contains articulation information such as envelopes and loop points. Articulation information can be specified for each individual region or for the entire instrument."
Real Audio 9	RealAudio is a proprietary encoding format from RealNetworks. It also supports repositioning during real-time playback.
eACC+ (EACC+, ACC+ V2)	eACC+ is ACC+ with the addition of Parametric Stereo (PS). PS significantly increases the codec efficiency a second time for low bit rate stereo signals.
ACC+ (HE ACC, ACC+)	'High-efficiency ACC' is the official MPEG name for the combination of ACC and Spectral Band Replication (SBR). SBR is a bandwidth extension technique which enables audio codecs to deliver the same quality at half the bit rate.



## Video formats

Format	Description
MPEG-4 ISO File Format (.mp4), ISO/IEC 14496-14, including MPEG-4 AAC-LC and AMR-NB audio.	File formats that are specified as a part of the ISO/IEC MPEG-4 international standard. It is used to store media types defined by the ISO/IEC Moving Picture Experts Group, and can be used to store other media types as well. It is, typically used to store data in files, though it will be used in data streams and possibly in other ways. *.mp4 allows multiplexing of multiple video and audio streams in one file, variable frame- and bit-rates, subtitles and still images. It also allows streaming over the Internet.
3GPP File Format (.3gp), 3GPP TS 26.234 V5.6.0, including MPEG-4 AAC-LC and AMR-NB audio	File formats which are used in mobile phones to store media (audio/video). This file format is a simpler version of "ISO 14496-1 Media Format". This format can only carry video encoded as MPEG-4 or H.263. Audio is stored in AMR-NB or AAC-LC formats
RealMedia	A digital sound and video file format that is the registered trademark of RealNetworks. This format is typically used to stream media through the net.

## Picture Editor formats

Format	Description
BMP	Microsoft® Windows Bitmap. A graphics format defined by Microsoft® supporting 1, 4, 8 or 18-bit colour depth. No compression, so files can be very large. Used for icons and very small images.
GIF	Graphics Interchange Format. Highly compressed by limiting the colour palette to 16 or 256 colours. GIF is therefore good for icons and diagrams. When a Note is sent as an email attachment, the GIF format is used.
GIF (animated)	A GIF animation containing a number of images in a timed and repeating sequence. Some P990i applications display only the first image in the sequence.
JPEG (.JPG)	An image compression format managed by the Joint Photographic Experts Group. The format supports various degrees of compression, enabling different quality/file-size balances to be provided in one standard. JPG files support millions of colours and are therefore good for 'real life' photographs.
MBM	Multi Bitmap. This is a Symbian OS format for colour and greyscale bitmap images.
PNG	Portable Network Graphics. PNG compresses images with millions of colours so there is no loss of detail, but has comparatively large file size. It is not commonly used.
WBMP	Wireless Bitmap. An image format optimized for small mobile devices. P990i supports Black and White, 2-bit greyscale and 6-bit colour modes, according to ETSI 3GPP TS 23.040



## PlayNow™

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PlayNow™ is a unique direct-link quality music download application. PlayNow users can connect to a live list of top music hits, videos, games and pictures. Content can be previewed before purchasing.

The content available from PlayNow differs from country to country. Games can not be pre viewed and are only available in certain phone modes.

## MusicDJ™

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A sampler music tool with MIDI drum, bass, chord and accent loops in different music styles, which can be combined to create polyphonic ringtones. MusicDJ™ is touch screen enabled, however it can only be used with the flip open.

## FM radio

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The FM radio works on the frequency bands:

- 87.5 to 108.0 MHz for US/ European.

A P900i handsfree headset or an accessory with a FM-radio antenna must be attached to the phone for the FM-radio to work.

These frequencies work worldwide with the exception of Japan.

The FM radio with RDS offers instant and easy access to FM radio channels. The RDS function displays radio text information directly on the screen in flip open mode, the information is sent out by the radio station the user is currently tuned in to. The stereo handsfree or the phone's loudspeaker can be used to listen to the radio.

Using the FM radio it is possible to do the following:

- The FM radio can be selected as the alarm signal allowing P990i to work as a clock radio.
- Displays frequency, station name, RDS, radio text and signal strength if the information is available.
- Automatic or manual station search.
- Enter required frequency manually.
- Save a station and customize its saved name.
- Automatically switch to stations when they are broadcasting news or traffic announcements.
- Mute the radio.
- Listen to the FM radio in the background whilst using another of the phone's applications.

## Games

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Gaming on the P990i is greatly improved due to the new 3D Hardware accelerator.

### Vijay Singh Pro Golf 2005

Vijay Singh Pro Golf 2005 simulates the experience of being the unseated golf champion. This game is one of the best games of golf available on a mobile. Pro Golf 2005 looks and plays like the best console golf sims of the 16-bit era.

- Choose from several golfer archetypes, ranging from the power hitter to the short-game wizard
- Take on Vijay on either nine or 18 holes.
- Choose from three difficulty levels.
- There is a standard swing meter, which uses timed button presses to determine a shot's power and accuracy.
- Aim your shot by rotating your character. The impact this has on your shot's trajectory will simultaneously be shown on a map of the hole.
- Putting uses a familiar meter as well, and it takes place on a wire-frame grid, the purpose is to impress you with the complexity of golf's short game.

In every shot situation, the control feels pretty tight, and there's a distinct difference between clubs. If you want to chip your way out of a bunker, you'd better use a sand wedge. This sort of realism is a must in the simulation category.

This very polished-looking 2D title seamlessly shifts between camera angles. Your viewpoint will shift at least twice on every stroke, highlighting different parts of the shot. In this way, Pro Golf 2005 does a better job of approximating the presentation of televised golf than its 3D competitors.

## QudraPop

QudraPop is a java™ based game that is optimized for flip closed mode. Qudrapop is a simple yet addictive game. To make an item disappear, you need to have at least four items of the same kind in connection with each other. The more items that disappear at the same time, the higher the score. During the game, blocking items may appear, to make it harder for the items to connect. A blocking item will go away only if an item next to it disappears.

# Browser

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P990i features the integrated Opera 8.0 browser.

The Opera browser has been designed to display practically all Web pages on the Internet. The browser supports the de facto HTML standard "street HTML" (used by most Web developers), JavaScript™, Frames, and the ability to add plug-in applications. This means that the users can access their favourite Web pages.

The browser is used with the flip open. Users can quickly and easily switch between portrait and landscape presentation as well as change from a normal view with scroll bars to a full screen view. The user can use pen motions to slide the page on the screen.

Users can select fit to screen to reformat pages to fit inside the screen width and eliminate the need for horizontal scrolling. (Small screen rendering is supported)

Some key features:

- Tap and hold on a bookmark to display the page in a new window.

- Context sensitive actions: tap and hold on a link or image to view its information dialog with a menu of context sensitive options. An http: link, would give the options; Open, Open link in new page, Copy link or Send link as.
- Secure downloads manager that is especially useful for downloading commercial media objects that need to be paid for.
- Pages can be saved for offline viewing.
- Built-in pop-up blocking.

## Browser security

P990i supports the TLS/SSL to provide a secure encrypted link between the browser and the Web site. This method is commonly used for secure transactions on the Web. An icon in the display indicates when a secure connection is in use.

### Certificates

To use secure connections, the user needs to have certificates saved in the phone. User certificates can be downloaded. There are two types of certificates:

Certificate authority	A certificate used to verify that a Web site is genuine. If the phone has a stored certificate of a certain type, it means the user can trust all WAP gateways which present a certificate that can be verified by the trusted certificate. Certificates can be preinstalled in the phone or downloaded from the trusted supplier's Web page.
User certificate	A personal certificate that verifies the user's identity. A bank that the user has a contract with may issue this kind of certificate.

P990i is loaded with WTLS/X509 certificates from Baltimore, Entrust, GlobalSign, GTE Cybertrust, RSA, Thawte and VeriSign.

## RSS feeds

RSS provides a way for Web sites to distribute their content outside of a Web browser. A news Web site might have an RSS feed which contains breaking stories, while a magazine Web site may provide an RSS feed with excerpts of their latest articles.

An RSS feed is a file containing a list of news items, each of which has a title, a description and a URL link to read more on the content provider's Web site.

With the RSS Feeds application the user gets information from the Internet into an easy-to-view format without browsing the Web sites. The user can browse information from dozens - or hundreds - of Web sites without ever visiting them.

RSS Feeds includes the following features:

- Subscription.
- Update feeds manually or via a predefined schedule.
- Organize feeds into folders.
- Read news items.
- Send a news item to another device via email, SMS, MMS, Bluetooth™ connectivity or infra-red.
- Link to more information via the Web browser.

# Connectivity

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## WLAN

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Wireless Local Area Network (WLAN) is a network access technology becoming increasingly common around the world. It allows users with portable computers and wireless devices to access network resources wirelessly, at the office, in the home, or in public spaces (public Access Zones or so-called “hot spots”) such as cafés, airports, aeroplanes and hotels.

P990i WLAN may be used as an alternative to any of the other types of network connection, such as, USB, GSM, UMTS, Bluetooth™ connectivity or infrared, and it may be chosen as the preferred connection method for any of the P990i data applications.

The WLAN functionality is compliant with IEEE 802.11b (11 Mbps), and will work simultaneously with the P990i GSM, UMTS, Bluetooth connectivity and infrared interfaces.

The WLAN functionality can be switched on or off as required, including when the P990i is placed into flight mode.

The P990i allows the user to rapidly make a connection to a public hot spot. A WLAN icon is permanently available on the P990i status bar and this icon may be used to open the WLAN set-up screen. The user may then turn on WLAN and scan

for available networks. A temporary connection to a chosen hot spot may then be made without the need for any technical details about the network.

It is important that data encryption can be used for hot spot connection but the authentication and association is open. It is possible to use WLAN in conjunction with a personal firewall and virus scanner.

For connection to a private network in the office or home, security is very important. P990i will support the following encryption/authentication methods:

- Shared (one or more WEP keys must be selected).
  - 802.1x.
  - WPA and WPA2.
  - WPA-PSK and WPA2-PSK
- WPA2 and WPA2-PSK are supported for enterprise networks as well as open.

Setting up the infrastructure network mode is simplified by the use of a wizard that presents relevant options after each selection is made. For example a WEP key selection screen follows the selection of shared encryption.

Virtual private networks software is supplied for use with the WLAN in infrastructure network mode.

# Memory Stick Duo™ and Memory Stick PRO Duo™

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Memory Stick™ provides a convenient way of adding storage and other functions to a wide range of devices. P990i supports Memory Stick Duo™ and

Memory Stick PRO Duo™. A 64 MB Memory Stick PRO Duo is supplied with P990i and sizes of up to 8 GB are supported.

A Memory Stick Duo can be plugged into any standard size Memory Stick slot using a Memory Stick Duo Adaptor. The two types have full electrical and file system compatibility.

## PC and Apple Mac support

PCs and Apple Macs may be enabled for Memory Stick via built-in Memory Stick slots, Floppy Disk adaptors, PC Card adaptors, USB adaptors and even a Memory Stick enabled mouse. (Memory Stick Duo Adaptor is required)

## Industry support

Memory Stick is supported by a wide range of companies including major names in consumer electronics, computing, automotive, mobile phone, photographic and semiconductor sectors of industry. As of December 2005, 588 companies have declared support at [www.memorystick.com](http://www.memorystick.com).

Memory Stick compliant products include PCs, PDAs, digital cameras, portable music players, printers, projectors and entertainment robots. Future applications include home and car audio, game machines and multimedia kiosks.

Memory Sticks are currently marketed by Sony, SanDisk, Lexar Media, I-O Data Device Inc. and Apacer Technology. As of February 2004, there were already over 60 million Memory Sticks in use worldwide. This is expected to reach 200 million in 2005. (Source: [www.memorystick.com](http://www.memorystick.com))

## Memory Stick in the P990i

Any number of Memory Stick Duo units can be used with P990i, providing virtually unlimited storage opportunities. Here are some examples of how Memory Sticks can be used with P990i:

- Additional storage for pictures taken with the Camera.
- Transfer images to other image-aware devices such as PCs and printers.
- Transfer data and media (sound, pictures, video clips, documents etc) between the P990i and a PC or Mac.
- Backup copies of important files can be stored on the Memory Stick.
- New applications can be installed from a Memory Stick.
- Third party applications can make use of Memory Stick storage.

- Transfer data using the Desk Stand between a Memory Stick in P990i and a connected PC.
- Personalize P990i using media on a Memory Stick.
- Use media on a Memory Stick when composing MMS messages.

Specifically, the following built-in applications are able to work with the Memory Stick: Camera images and video, Media player, Email (attachments), Viewers and Editors (such as QuickWord), MMS (media), Browser, Phone (ringtones, screen-saver), Contacts (pictures of contacts; ringtones).

The Memory Stick supplied with P990i is shipped with the following applications on it:

- Virtual Private Network client (free software for corporate WLAN connection).
- Virus software (trial version).  
McAfee<sup>TM</sup> VirusScan Mobile provides the leading solution for real-time protection against viruses, worms, dialers, Trojans and battery-sapping malware providing a safe mobile experience. VirusScan Mobile is the only product designed from the ground-up for mobile protection. It protects against the threats that originate from e-mail, instant messaging, and internet downloads. Your device will be protected from SMS, MMS, Bluetooth and other entry points. This product delivers a safe and worry-free mobile experience for your mobile life. Up-to-date protection is delivered as soon as threats are identified. Installation is fast and easy. VirusScan Mobile brings the ultimate in mobile device protection.

- Firewall software (trial version).
- File encryption software (trial version).

## Compatibility with other memory stick devices

P990i defines its own folder structure on a Memory Stick, within a vendor-specific area and this is the only area that can be accessed by all of P990i applications, except for the File manager. The File manager may be used to move files between the P990i's MMFH (Multimedia File Handling) system and folders placed on the Memory Stick by other devices, thus allowing files to be shared between P990i and other devices.

## Memory stick connected to a PC

Using the supplied Memory Stick Duo Adaptor, P990i Memory Stick Duo/PRO Duo may be inserted into a PC or camera that supports Memory Stick.

## Bluetooth™ wireless technology

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P990i features built-in Bluetooth™ 2.0 wireless technology. Its Bluetooth power class 2, +4 dBm radio link, operates in the globally available 2.4 GHz radio frequency band, ensuring fast and secure communications up to a range of 10 metres, or more in ideal conditions. Please note that in the few countries where the use of Bluetooth wireless technology is not allowed, the Bluetooth function will be disabled. In countries where only lower output than 4 dBm or 0 dBm is allowed, the output is limited as a customized factory setting.

Bluetooth wireless technology facilitates instant connections, which are maintained even when the devices are not in the line of sight. Enhanced audio quality voice transmission is provided under adverse conditions, making it possible to use a headset connection at all times.

### Using Bluetooth™ wireless technology in the P990i

#### True wireless connection

Connect without cables to headsets, car handsfree equipment, computers/PDAs, digital still and motion video cameras and other devices.

#### Up to 16 added devices

The P990i identifies and maintains up to 16 devices which are displayed in a list.

#### Radio link

No line of sight is required; the phone can remain in a briefcase or in a pocket (whereas infrared requires line of sight).

#### Secure and fast

Data connection with a Bluetooth™ connectivity PC/laptop or PDA turns the phone into a modem for connecting to the Internet and for data transfer (faster than infrared or cable).

#### Synchronization

Fast synchronization, even without line of sight, of calendar, notes and phonebook with PC/laptop.

#### Business cards

Quick exchange of business cards, notes and calendar events with other phones and devices.

#### Imaging and music

Exchange still images and video clips with another mobile phone, a PC/laptop, and with a digital still and motion video camera. Use the P990i as a modem to send pictures from a digital still and motion video camera to an imaging server.

Exchange music files with another mobile phone and a PC/laptop. Play MP3, MIDI sent by the phone.

Enable images to be shown on a TV or other display via an accessory, such as the Bluetooth™ Media Viewer MMW-100.

#### Audio quality

P990i uses an algorithm that repairs lost audio packets. When needed, a new packet is inserted with content based on previous packets. This, in conjunction with the high sensitive and high output power radio will enhance the audio quality compared to a standard Bluetooth device.



## File sharing

By using the Server role of the File Transfer Profile, the phone enables the user to use a computer to manage content files that reside in the phone's file system or on the Memory Stick™. Most computer Bluetooth applications provide an explorer like user interface for the file transfer service. When connecting to the phone, the computer application will show one folder for the content in the phone's file system and one folder for the content on the Memory Stick. The content in the Games and more folder is not exposed in the file transfer server. Opening one of the folders will show a list of files related to that folder, such as, images in the Pictures folder. Using the computer application the user can now: retrieve files from phone to computer, delete files from the phone and transfer files from the computer to the phone using the normal drag and drop mechanisms provided by the computer.

## File browsing

By using the client role of the File Transfer Profile, the phone enables the user to access file systems of other devices, that support the server role of the same profile. After pairing the phone with the other device, the user can connect to the other device by selecting it in the list of My devices under the Bluetooth menu and selecting the Browse option that should be available on the left selection key. If the browse option does not appear the user can select the Service option to update the phone's knowledge that file browsing is possible with this device. When the phone is connected to the file server, the user can browse the shared folders and retrieve files listed in the folders. The user can transfer files to the file server device using the normal Send/via Bluetooth option.

## Media viewing

The phone can send images and sounds to a media viewer device, such as, the MMW-100 TV adaptor accessory. The user can also conveniently run a slide show on the TV showing a set of nice phone camera pictures for family and friends. The phone can connect to a Bluetooth device that can receive images, the image can be transferred to the remote screen and displayed.

## Profiles

The following Bluetooth profiles are supported in the P990i:

- Dial-up Networking Profile.
- Generic Access Profile.
- Generic Object Exchange Profile.
- Object Push Profile.
- Serial Port Profile.
- Handsfree Profile.
- Headset Profile.
- Synchronization Profile.
- Basic Imaging Profile.
- File Transfer Profile.
- Human Interface Device (HID) host only Profile.
- Stereo Advanced Audio Distribution Profile.
- Advanced Audio/Video Remote Conference Profile.

## Remote control

The phone keypad is configured for control of a certain computer application through a special type of HID configuration file consisting of an XML file for the keypad and an image for the display. HID configuration files can be downloaded into the phone using the normal file transfer mechanisms.

Users can even modify the files themselves on their computers. A few configuration files pre-loaded in the phone enable the user to navigate on a computer desktop and control presentations and Media players.

## System functions

### Characteristics

The HID configuration files, and the set of predefined HID configuration files, are customizable. The configuration files can be modified by the user if transferred to, and opened on, a computer.

### Used enablers and bearers

The HID based remote control function works over Bluetooth. It is possible to download the HID configuration files via Bluetooth, Wi-Fi, IR or USB. It is also possible to transfer the files to another device using Bluetooth or infrared.

### Power save mode

The phone uses sniff mode on headset, handsfree and HID connections which means reduced power consumption and shorter connection set-up times.

## IrDA

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IrDA (Infrared Data Association) is a point-to-point communication link between two infrared ports. The infrared beam has to be directed towards the target infrared port and as long as the two infrared ports are within sight and range, the devices can exchange data.

Object Exchange via infrared (IrObex) supports transferring objects between compatible phones. You can use P990i to control electrical devices that have an infrared port, such as, a television or DVD player.

## USB

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P990i is USB 2.0 (Universal Serial Bus) compliant. The bus is 12 Mbps and supports 63 devices. The idea of the USB is to allow easy connection of mobile phone to PC. USB is designed to be “completely Plug and Play”, meaning that devices will be correctly detected and configured automatically as soon as they are attached.

USB in a mobile phone means convenient data transfer between the phone and a PC.

P990i supports USB charging, you can charge your phone by plugging the USB lead into the PC, this is very useful if you travel a lot. The Memory stick™ is also visible on the PC as a mass storage device.



# Data storage

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P990i is divided into two parts:

- A GSM phone part, having flash memory. This is very similar to a conventional mobile phone.
- An 'Organizer' part running Symbian OS and having a large amount of flash and RAM memory plus a Memory Stick™ slot and the ability to exchange files with a PC.

The RAM (Random Access Memory) is controlled by the Symbian OS operating system and is not used to store any user or program data. The RAM is totally re-initialized when P990i is started.

The available 128 MB flash memory is split into 68 MB for operating purposes and up to 60 MB for storage of user data, such as, audio files, pictures, documents, additional languages and settings such as the active theme. Flash memory retains data even with no power applied. Unlike some PDA devices, P990i does not require a small 'memory

backup' battery. Data stored on P990i is therefore not subject to loss due to such a battery running down.

The first 48 MB bank is used like a ROM. It stores the Symbian (UIQ) operating system, the built-in applications and some essential multimedia information like a default ringtone. It also stores the language files for UK English which is the default language of the Standard P990i. Chinese models also have Chinese stored on the ROM.

Note: The extensive MMI of P990i means that it is impractical to hold many languages inside the phone, as is the case for some other models.

Part of the flash memory provides a 'C:' drive of up to 60 MB capacity. This behaves just like a normal disk drive. The folders can be viewed and managed from the File manager application or from a connected PC.

## User storage

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The user storage space (C: drive) is shared across applications without any imposed restrictions, apart from the whole space becoming full.

Unlike a PC, the user does not need to be aware of the underlying filing system. Applications will always store information automatically in the appropriate folder, simplifying the management of data. Third party applications may implement more complex file management solutions where required.

Additional storage space is available by using Memory Stick™. A 64 MB Memory Stick Duo is included with P990i and Memory Sticks of up to 8 GB capacity are supported. Any number of Memory Sticks may be used for storage. Memory Sticks may be used to exchange data with other devices. See "Memory Stick Duo™ and Memory Stick PRO Duo™" on page 36 for more information.

Depending on the application, data can be beamed, mailed, uploaded to the Web, transferred to a PC or moved to a Memory Stick in order to archive and create free user space on P990i. See "Synchronization and data transfer" on page 42.

### User storage configuration in the new P990i

Applications and information are placed in the internal storage of P990i in the factory. This provides sample demonstration, educational, multimedia and fun content so that P990i can be used directly out of the box. Much of this can be deleted by the user in order to make the space available for personal use.

## Action at master reset

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Master Reset restores the phone to its purchase state, all user data is deleted. When a Master Reset is initiated the user can select to keep all user-installed applications. Data can be restored as follows:

If the user has previously backed up P990i using the Sony Ericsson PC Suite, then the C: drive can be restored to the condition it was in when the backup was made. The exception is DRM Forward lock protected files which cannot be transferred to other media or backed up.

Otherwise, data can be re-loaded from the following locations:

- Content CD.
- Try and Buy applications on the Memory Stick™.
- Sony Ericsson Web site.

Since Multimedia content is easily transferable using Memory Stick, Wi-Fi, infrared or Bluetooth™ wireless technology beaming, it is simple to restore favourite content from someone else's P990i (unless DRM protected).

## Folder view of internal storage

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This section explains in more detail how the data is organized on the C: drive.

When viewed from a PC using Sony Ericsson PC Suite, the 'C:' drive is named 'Phone Memory', but only a subset of the folders is accessible from the PC.

There is a folder for each media type: audio, video and image. Documents (such as Microsoft® Word files) are stored under the 'document' folder. An 'other' folder provides a place for files that do not fit into the other categories.

A folder is created beneath the applicable media type. There is no limit on the number of subfolders that can be created. Unfiled folders are created in the initial folder structure and all material is placed in the unfiled folder by default. Sony Ericsson Multimedia Content is stored in 'Sony Ericsson' sub-folders.

## Synchronization and data transfer

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To be truly mobile, users must be able to carry their important information with them. Equipping mobile phones with Personal Information Manager (PIM) programs like calendars, task lists and phonebooks gives users access to their most important data anywhere and anytime. The information is kept updated by synchronizing it with the information at the office or at home. The growing use of groupware such as Microsoft® Outlook® means that more and more meetings are booked electronically in daily business life.

P990i uses the SyncML 1.2 protocol for synchronization. This means that it has the compatibility to synchronize with a wide variety of devices over a number of different communications media.

# SyncML – an open standard for synchronization

## SyncML background

Leading the way in providing remote synchronization capability, Sony Ericsson realizes that interoperability of remote synchronization is of utmost importance if mobile data usage is to become as widespread as generally predicted. That is why Ericsson, along with IBM, Lotus, Motorola, Matsushita, Nokia, Palm Inc., Psion and Starfish Software, founded the SyncML initiative in February 2000. Supported by more than 600 software and hardware developers, the SyncML initiative seeks to develop and promote a globally open standard for remote synchronization, called SyncML. Unlike many other synchronization platforms, SyncML is an open industry specification that offers universal interoperability. Because it uses a common language, called XML, for specifying the messages that synchronize devices and applications, SyncML has been called the only truly future-proof platform for enabling reliable and immediate update of data. The benefit for the end user is that SyncML can be used almost anywhere and in a wide variety of devices, regardless of application or operating system.

P990i uses SyncML for both local synchronization (with a PC using Bluetooth™ connectivity or a cable connection) and remote synchronization over HTTP.

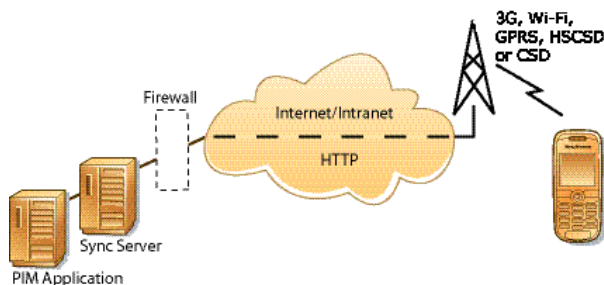
## What information can be synchronized in the P990i?

Application	Remote sync	Local sync
Contacts	✓	✓
Calendar	✓	✓
Tasks	✓	✓
Note (text part only)	**	✓
Email	**	✓
Bookmarks	**	✓

\*\* Note, Email and Bookmark implementation are proprietary and therefore not SyncML compliant.

## Remote synchronization

Remote synchronization takes place over the air using HTTP and is the ideal way to keep the P990i up to date. 3G enables a fast connection to the network - the synchronization can be started in seconds.



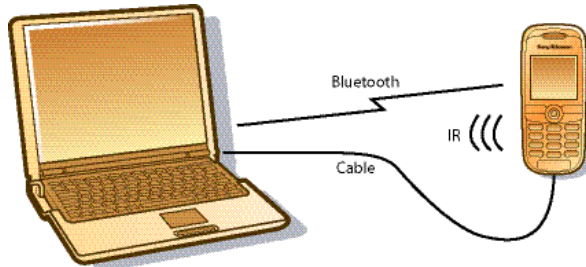
Synchronization services will be offered by third-party service providers and as added capability to corporate PIM applications. Corporate PIM applications such as Microsoft® Exchange can be supplemented with SyncML capability.

## Server alerted synchronization

If updates are made on the PC the server automatically notifies P990i. The updates are automatically synchronized to P990i. A remote server can initiate a synchronization with the P990i using WAP Push.

## Local synchronization

P990i is supplied with PC software for local synchronization. It may be loaded from the CD-ROM.



### Bluetooth™ wireless technology, infrared or cable

P990i always synchronizes using SyncML, regardless of connection type. It connects via Bluetooth™ wireless technology, infrared or cable. The cable is connected directly to the phone or via the desktop charger connector.

### Synchronization capacity

P990i meets the standard performance requirement to synchronize the following number of items “within a reasonable time”:

Contacts	2000
Calendar items	1000
Notes	500
Tasks	500
Email messages	1000
Bookmarks	500

### Automatic synchronization

Synchronization can be configured to start automatically, given that a suitable synchronization program must be running on the other device:

- When the USB cable is plugged in to P990i.
- When P990i is placed in to the Desk Stand and the Desk Stand is connected to the other device.
- When Bluetooth is activated on both devices and they come into operating range.
- When infrared is activated on both devices and the infrared sensors are aligned.

### Intelligent process

A synchronization engine performs the task of synchronizing. For local synchronization, the synchronization engine is an application that runs on the desktop computer. The synchronization engine compares, updates and resolves conflicts to ensure that the information in the phone is the same as that in the computer.

### Compatibility

The PC software, supplied with the phone, enables synchronization with the following applications:

- Microsoft® Outlook® Express 4.0, 5.x.
- Microsoft® Exchange.
- Microsoft® Outlook® 2000, 2002, 2003.
- Microsoft® Internet Explorer 5.0 and 6.0 (for Bookmark synchronization).
- Lotus Notes® 5.0, 6.0, 6.5.

The PC requirements are as follows:

- 120Mb free space on hard disk.
- Microsoft® Windows® 2000 (SP4) or XP Professional or Home (SP2).
- Minimum recommended hardware configuration for the version of Windows in use.

### File transfer utility

A utility is provided which enables files to be transferred to and from P990i connected to a PC. Typical uses for this include:

- Archiving pictures taken on P990i to PC storage.
- Moving images to P990i to use in personalization, MMS messages etc.
- Storing MP3 files on P990i or the Memory stick™.
- Moving sound clips to/from P990i for personalization.
- Store work documents (Word, Excel) on P990i to read on the move.

### Backup and restore

Backup is initiated from the connected PC. Note that the Desk Stand or the USB cable must be used for backup. Infrared or Bluetooth wireless

technology cannot be used for this. Files in the user data area (which includes loaded third party applications) are backed up to PC storage.

The restore utility takes stored data from the PC and places it back on to P990i.

## Language change utility

P990i has a larger, richer UI compared to an ordinary mobile phone. Applications often have help information. Consequently, it is impractical to store languages on the phone. To facilitate a language change, a PC utility is provided which enables the required language to be loaded on P990i. The Language Change Utility is not available for Chinese models.

## Software installation utility

This utility enables P990i applications to be installed from the PC.

## Internet wizard

This utility assists the user to create 3G, GPRS, HSCSD and CSD connection definitions for Internet and email use. All the necessary information can be entered in a logical way. Set infrared status to Modem in the Control Panel to use this facility over infrared.

## Apple® iSync

The latest version of Apple's iSync is supported by P990i. Using Bluetooth, iSync can synchronize Contacts, Calendar and To Do items between P990i and a Mac computer.

## Object exchange - 'send as'

P990i makes it easy to transfer objects over Wi-Fi, Bluetooth, infrared and Messages. This is presented to the user via 'Send as' commands in applications. Simply select an item such as a contact, select 'Send as' and select the method to be used for sending. Typical applications are to beam an appointment to other people, or to receive a new background image.

Bearer >	IR	Bluetooth	SMS	MMS	Email
Application (Data Type)					
Contact (vCard)	✓	✓	✓	✓	✓
Appointment (vCall)	✓	✓	✓	✓	✓
Tasks (vCall)	✓	✓	✓	✓	✓
Note**	✓	✓	✓	✓	✓
Image	✓	✓		✓	✓
Sound Clip (Ringtone)	✓	✓		✓	✓
Bookmark	✓	✓	✓	✓	✓
Sound recorder (Voice Notes)	✓	✓		✓	✓
Third Party Application ('Send as' API)	✓	✓		✓	✓

To perform a 'Send as' beam operation using Wi-Fi, the receiver must be Wi-Fi enabled and be able to connect to P990i.

To perform a 'Send as' beam operation using infrared, the two devices are lined up and the sender initiates the transfer.

To beam over Bluetooth, a scan finds other devices within range. The user can then select the required device and send the information across.

When sending over SMS, MMS or email, the required message type is created with the selected object attached. It is then sent over the air.

# Sony Ericsson PC suite

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The Sony Ericsson PC Suite CD-ROM includes the following:

Local Synchronization	PC software for synchronizing PIM data between the phone and PC applications such as Microsoft® Outlook® and Lotus® Notes®.
Backup and Restore	Utility to back up the data from the phone for storage on a PC. Restore enables data to be returned to the phone, such as, after a software upgrade. This operation must be performed using the phone Desk Stand.
File Manager	Enables Windows Explorer to see the phone as a device and the internal and Memory Stick™ storage as two disk drives on the device. Multimedia files may be copied between the PC and the phone.
Software Installer	Utility to install new applications from the PC.
Language Change Utility	Enables the user to load a different language from the CD-ROM and switch the phone UI to that language, assuming the specific phone supports this. The language files are also available at <a href="http://www.SonyEricsson.com/support">www.SonyEricsson.com/support</a>
Applications	Teleca PC Suite including: File Manager, Sync Manager, Backup Manager, MMS Composer, Application Installer and Download Language. Communication Centre. Quicktime 7.0. Sony Ericsson Updater Server. Adobe Photoshop SE 3.0. Sony Disc2Phone 1.2. Seven Push EMail Client.
Internet Wizard	Wizard for creating 3G, GPRS and HSCSD settings for Internet and email connections.
Drivers	Drivers for using the phone as a modem over infrared, Bluetooth or Cable. USB driver for the DSS-25 Desk Stand.

## DRM

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Digital Rights Management, DRM, is a technology that enables secure distribution, promotion, and sale of digital media. Examples of such content include music, personal images, wallpapers and screen savers with themes from films, ringtones from musical artists, and branded games. In other words, content providers can control how users may use different types of content in devices, such

as mobile phones, phones or PDAs. Content providers can also control the use of content in related services, such as MMS and download. Sony Ericsson is actively focusing on technology standardization for the DRM concept, and supports the ongoing standardization work and activities of the OMA (Open Mobile Alliance). Sony Ericsson is fully committed to open standard solutions in the



mobile environment and is a principal driver of many open standard initiatives. This will ensure the interoperability of mobile terminals in the DRM area and also result in a strong, competitive DRM standard.

### **FWL – forward lock**

P990i supports OMA DRM Forward lock which is the simplest OMA DRM case, with no special access keys defined. The content is provided in a single DRM packaged file, thus protecting the content from being distributed from the device by the user. It enables a secure means for the content provider to deliver/provide content which incurs a charge. Forward lock content will normally be received by P990i as part of an MMS message or via HTTP download. P990i supports OMA Download. More information is available at [www.SonyEricsson.com/developer](http://www.SonyEricsson.com/developer).

### **CD – combined delivery**

P990i supports OMA DRM combined delivery/forward lock. Content and associated access keys are downloaded or delivered to the user as a single DRM packaged file. This means the content or access keys issuer controls the extent the content can be used. As with pure forward lock the user will be unable to distribute this content to be used on another device.

### **SD – separate delivery**

P990i supports OMA DRM Separate delivery. Content and associated access keys are received as separate DRM packages, either simultaneously or at different points in time. This enables the distribution of content to other users and has the same possibilities to control usage of the content exist as with combined delivery/forward lock. Distribution

of the content to other users will require the recipient to obtain access keys from the rights issuer in order to use the content.

### **Protection properties**

Content protection according to the OMA DRM standard gets special properties.

Content with Forward lock protection cannot be further distributed: The user cannot send the content to other devices since the “Send to” option is disabled for media protected with Forward lock.

All three types of received content packages can be transferred to the Memory Stick™ thereby enabling storage of large amounts of content.

OMA DRM forward lock/combined delivery protected content on a Memory Stick cannot be used in another device other than the device it was saved on. Only separate delivery packages can be used on another device, after obtaining access keys to use the content on the new device. Thus, the Memory Stick is one way of distributing separate delivery content to several users. Access keys to use the content can never be distributed from user to user (device to device). Access keys always have to be obtained directly from the rights issuer.

### **DRM package**

DRM packaging software is typically included in the software used by the content provider. It is used to create the DRM package according to the OMA DRM V1 standards before it is delivered to the device, including content and associated access keys.

In Japan, only files with SD protection for playback will be accepted in the Media player and in some European markets only DRM content can be used for automated use/themes such as ringtones.

## **Personalization**

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The P990i can be personalised by the user in one of the following ways:

- Update the User Interface using services, such as, M-Service.
- Use PC-based utility application.

- Via Over the Air (OTA) configuration, initiate by the operator, user or IT helpdesk.

Alterations to the appearance of many of the screens may be simply carried out through changing the phone's Theme. New Themes may be loaded on to the P990i from the Internet and other sources.

## Background and application shortcuts

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User can set a static image, or animated GIF, to be the background 'wallpaper' for the flip closed standby screen. Image size is 208 x 189 pixels and formats JPEG, GIF, BMP, WBMP, MBM and PNG are supported. Larger images, such as, a 640x480 picture from the Camera will be resized to fit.

Correspondingly, a separate background can be set for the Application launcher view in flip open. The size for flip open background is 208 x 254 pixels. The same formats as for flip closed is sup-

ported, with the limitation that for an animated GIF file, only the first frame is displayed (as a static image).

The application shortcut buttons may be personalized by the user. The user may also select to have them displayed all the time. The flip closed background can also be set directly from a received MMS message, and flip open background can be set directly from the Images application.

## Screen Saver

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A 'screen saver' image is displayed after a period of inactivity. The user can switch this facility on and off and select the delay period before the screen saver is displayed. Image size is 208 by 320 and the format is the same as the flip closed background image above. Note that use of animated GIF increases power consumption. The top part of the image is displayed in flip closed mode and the entire image is displayed in flip open mode.

Device lock may be used in combination with the screen saver. Upon pressing a button or touching the screen, the user will be prompted to activate keys and/or enter the device lock code.

When the screen saver is deactivated, the P990i will revert to the state it was in before the screen saver was activated.

## Picture phone book

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The user may store a picture of each contact in the Contacts application. When an incoming call is received with CLI matching that contact, the contact's picture will be displayed together with the other information. The contact's picture is also displayed when making a call, or using the speed dial screen in picture view mode. Pictures are easily taken using the Camera, though of course other images can be loaded in to Contacts. A copy of the picture is held in the Contacts database; therefore, the original picture may be deleted or renamed without losing the copy stored in Contacts.



## Ringtones

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The user can add as many ringtones as desired, subject only to available file space. Ringtones may be collected from many sources including Memory Stick, MMS, EMS and transfer from a PC.

Any compatible audio file in the multimedia storage (Internal or Memory Stick) including MP3 can be selected as a ringtone. The P990i can play both iMelody format ringtones and the following polyphonic formats: AMR, AU, MIDI, RMF (Beatnik), MP3 and WAV.

A system default ringtone is provided. This is the ringtone when the P990i is first initialised. It cannot be deleted and is retained after a Master Reset.

A Personal ringtone may be selected for a contact - simply select the required ringtone while entering or editing the contact's details. When the Calling Line Identification (CLI) of the incoming call is matched to a contact, the Personal ringtone for that contact will be played. If the ringtone has been deleted, moved, renamed or exists on a Memory Stick that is unplugged, then the system default ringtone will be played.

If no CLI information is available, then only a default ringtone can be played. If the user has selected a personalized default ringtone and it is available (can be read from the internal storage or Memory Stick) then it will be played, otherwise the system default will be played.

## Themes and skins

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A Theme or skin is a way to provide a complete customized visual experience for the user.

Themes can define:

- Text, outline and background colours.
- Background images.

- Graphical appearance of interface elements.
- Sounds for events, for example, ring signals, message alerts, notification, area info, auto set-up and reminder.

Themes and skins can be created or downloaded.

## Over-The-Air (OTA) configuration

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OTA remote configuration provides a simple setup of services. The user is spared the task of finding complex technical information and then manually entering it via the user interface. Instead, a Web request or a call to the mobile operator's helpdesk is all that is needed – the appropriate settings are then sent via SMS directly to the phone.

OTA configuration using the OMA Client Provisioning v1.1 (WAP OMA Provisioning) specification – a backward compatible extension of the client provisioning functionality included in WAP 2.0 (v1.0) – enables the following parameters to be provisioned:

- WAP account (account name and WAP Gateway settings).

- ISP settings (bearer information, username, password).
- Browser settings including Bookmark (name and URL).
- OMA DS Sync settings (SyncML).
- MMS settings.
- Email account for POP3, IMAP4 and SMTP including settings (username, password, address, server details).
- OMA Device Management.

## Sony Ericsson phone configurator

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To configure the phone for Internet, email and MMS the necessary settings for many networks can be downloaded from [www.sonyericsson.com/support](http://www.sonyericsson.com/support). This is a free service to owners of Sony Ericsson mobile phones.

## Locks

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P990i has the following lock functionality:

### Keylock

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The keylock can be turned on or off by:

- The lock button.
- The standard keypad sequence in flip closed (# then unlock)
- The status bar battery icon dialog (in flip open)
- Closing the flip to lock the phone (if it was previously locked before opening)
- Opening the flip to unlock the phone.

Locking the keypad can invoke the 'power save now' option or the screen saver (user setting).

Auto keylock is a user setting, only activated from standby.

#### Flip closed

Keylock can be initiated from anywhere within the device.

If there is active audio (call/music) the Jog Dial will control the volume even when the device is locked.

It will be possible to control an active call even in a keylocked state.

#### Flip open

Keylock can be initiated anywhere in the applications. Initiating the keylock causes the current application view to remain open but locks the keys/screen (with the exception of the keylock slider).

Locking the phone during an active call in flip open evokes a semi locked state where the screen is locked but still registers key presses.

If there is active audio (call / music) the Jog Dial will control the volume even when the device is locked.

It will be possible to control an active call even in a keylocked state.

### Phone lock

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The phone lock can be set to off, power on or when SIM changed.

If the phone lock is set to off your P990i is not protected and can be turned on by anyone.

If the phone lock is set to power on, everytime the P990i is switched on the user will have to enter a predefined code.

If the phone lock is set to when SIM changed the user will be asked for the phone lock code when the P990i powers up.

## SIM card lock

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The SIM card lock can be set to off or power on.

If the SIM card lock is set to off the SIM can be used in any mobile device where the user know the phone lock (if set).

If the SIM card lock is set to at power on, everytime the P990i is switched on the user will have to enter a predefined code.

## 3G

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Increased 3G data rates, together with extended multimedia and entertainment content, has enhance the use of mobile Internet in a revolution-ary way.

The 3G (third-generation) service combines high speed radio access with IP (Internet Protocol)-based services.

The connectionless nature of IP makes access a lot faster: file downloads take less time and we can be connected to a network within a few seconds.

3G has significantly boosted network capacity allowing operators to support more users, and offer more sophisticated services. This phone is dual mode, meaning the user will be able to use P990i without having to think about which system is in operation – the handover between the two systems is seamless.

### GSM and WCDMA development

Wideband technology is deployed in parallel with the enhancement of the existing spectrum, re-using parts of the GSM infrastructure. All spectrum assets are valuable, as there is a substantial increase in both the number of subscribers and the volume of traffic in the networks. This seamless solution gives operators a flexible network where the systems interact according to current demand.

### User experience

For the consumers, using a network consisting of GSM, GPRS and WCDMA parts is a seamless experience. GPRS allows qualified mobile Internet applications, while the introduction of WCDMA brings a whole new set of user services, using the full potential of wideband data transport

### Handover/service continuity

The scope of this text includes service requirements for handover maintaining continuity of service to a wireless terminal, as it moves between the radio coverage area, or “cells”, associated with different base station sites. This functionality is called “handover”. It is a key requirement to allow for dual or multi-mode terminals to handover traffic from UTRAN to other radio systems such as GERAN and vice versa. This part describes the general principles for service continuity within UMTS Radio Access Network, within GSM/GPRS and between UMTS Radio Access Network and other radio systems such as GSM/GPRS. As a principle, the requirements on service continuity characteristics should be according to the target network on which the service is maintained.

### Service continuity

Service continuity should support the following scenarios:

- Continuity of active circuit switched services when moving within UMTS Radio Access Network, within GSM/GPRS and between UMTS Radio Access Network and GSM/GPRS coverage areas.
- Continuity of active and packet switched sessions when moving within UMTS Radio Access Network, within GSM/GPRS and between UMTS Radio Access Network and GSM/GPRS coverage areas.

### General operational considerations

Mechanisms defined to support service continuity between different radio systems or radio access modes should effectively cope with a number of coverage scenarios:

- Limited coverage in a “sea” of coverage provided by another radio system or radio access mode.
- Selective operation at a geographical boundary, with extensive UMTS Radio Access Network coverage on one side, and extensive coverage from another radio system on the other side.
- Geographically colocated areas of UMTS Radio Access Network coverage and another radio system.

### Performance requirements

#### Temporary degradation of service caused by handover

During intra-UMTS Radio Access Network handover or handover from UMTS Radio Access Network to GSM/GPRS, degradation of service should be no greater than during intra-GSM/GPRS handover. The duration of the discontinuity experienced by packet switched and circuit switched real time services should be shorter than that in the handover of voice calls over GSM/GPRS.

#### Requirements on multiple bearer services handover from UMTS radio access network to GSM/GPRS

Consideration must be given to services that may involve multiple bearer services (and simultaneous sessions). The mapping between UMTS Radio Access Network bearer services and GSM/GPRS bearer services depends on many factors such as data rate, delay constraints, error rate etc. In the event that certain UMTS Radio Access Network

bearer services cannot be handed over to GSM/GPRS, the handover of some of the bearers to maintain the service should not be precluded.

In the case where a user equipped with a dual mode terminal is in UMTS Radio Access Network coverage, and has multiple PDP contexts activated (for instance to support multimedia), then it is preferable to handover one PDP context, rather than dropping all of them.

As a first priority only the PDP contexts which have an associated QoS that can be supported by the GSM/GPRS should be candidates for handover.

If there are still multiple PDP contexts as “handover candidates”, then the operator should choose which PDP is maintained. When roaming, the serving network should make this decision. The operator may choose to either:

- Drop all of the PDP contexts.
- Choose one based upon criteria such as duration, amount of traffic transferred, etc.

### Handover in P990i

This phone is compliant with the 3GPP R99 December 2002 release.

#### GSM to UMTS

The product supports circuit switched voice handover from GSM to UMTS.

#### UMTS to GSM/GPRS

The product supports packet switched data handover and circuit switched voice handover from UMTS to GSM/GPRS.

# Positioning

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The basic cost efficient positioning method available in 3G networks relies on measuring round-trip time. In 3G it is called Cell-ID + TA (Timing in Advance).

Time difference measurement, involving several base stations, can be used to obtain a more accurate position.

Positioning methods are already used to support location-based information services such as ©YellowPages, restaurant guides, traffic information, directions and friend finder applications. Typically SMS or voice has been used as delivery mechanisms. Java™ and MMS will add new possibilities to deliver attractive location-based applications.

# GPRS

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The introduction of GPRS was a big step in the evolution of the GSM networks for enhancing the capabilities of data communication. Data traffic has increased (over both wired and wireless networks), with the growth in demand for Internet access and services paralleling that of mobile communications.

We can now see that the demand for high-speed Internet access is the key driver for coming generations of wireless multimedia and entertainment services, and GPRS is important as a stepping stone when we enter the 3G network era. GPRS has allowed innovative services to be created and granted access to new and previously inaccessible market segments, which will be further developed with 3G.

GPRS is able to take advantage of the global coverage of existing GSM networks. Applications developed for GPRS have been deployed on a large scale and have thus reaped the associated benefits.

With GPRS, P990i sends data in “packets” at a very high speed. The phone remains connected to the network at all times, using transmission capacity only when data is sent or received. Instead of occupying an entire voice channel for the duration of a data session, P990i sends and receives data in small packets, as needed, much like IP on the Internet. Thanks to this, the phone is always online, using transmission capacity only when data is sent or received. P990i is compatible with GPRS

R99. The GSM system limits the ability to use all eight time slots, so P990i uses up to four time slots for receiving data, and up to one slot for transmitting.

Information about the identity of the phone and the characteristics of the connection are described in the PDP (Packet Data Protocol) context. This information is stored both in the phone and in the mobile network, so that each phone is identified and “visible” to the system.

Using GPRS with P990i has many advantages:

- **Constant connection**  
Keep an open connection to an email system or the company network, staying online to receive and send messages at all times. All connection settings can be managed by using the data connections feature.
- **High speed**  
Gain access automatically to increased bandwidth when downloading large files, images etc.
- **Cost efficient**  
Use transmission capacity only when needed, thus reducing costs.
- **Email over GPRS**  
Remain connected to an email system while reading and preparing messages, (which are then sent at high speed).

# Symbian OS operating system

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Symbian OS is the open operating system licensed by the world's leading mobile phone manufacturers. It is designed for the specific requirements of advanced 2G, 2.5G and 3G mobile phones. Symbian OS combines the power of an integrated

applications environment with mobile telephony, bringing advanced data services to the mass market.

Symbian OS supports a wide range of device categories with several user interfaces, this includes UIQ, which is the software platform used by P990i.

## Key features of Symbian OS v9.1

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### General

- Improved system performance, especially at start up.
- New multimedia framework supporting recording, playback and streaming.
- Direct access to screen and keyboard gives high performance; graphics accelerator API; and increased UI flexibility (support for multiple simultaneous display, multiple display sizes and multiple display orientation).
- Java™ support for the latest wireless Java standards. See “Java™” on page 55 for more details.
- Communications protocols using; wide area networking stacks including TCP/IP (dual mode IPv4/v6) and IPSec. Improved personal area networking support including infrared (IrDA), Bluetooth™ connectivity and the introduction of USB. Support is also provided for multihoming and link layer Quality-of-Service (QoS) on GPRS and UMTS networks.
- Symbian OS v9.1 is ready for the 3G market with support for: WCDMA (3GPP R4); GSM circuit switched voice and data (CSD); packet-based data (GPRS); SIM; and U-SIM.
- Supports the Unicode Standard version 3.0.
- Data synchronization has been improved to cover the following: over-the-air (OTA) synchronization support using OMA standards (OMADS 1.2); PC-based synchronization over, Bluetooth connectivity, infrared and USB; a PC Connectivity suite providing the ability to transfer files and synchronize PIM data.

- Improved device management which provides network operators and enterprises with new capabilities to manage phones in the field. This includes OMA DM 1.1.2 support and OMA client provisioning 1.1.
- Support for Bluetooth wireless technology eSCO and Bluetooth stereo headset profiles have been implemented.

### Security

The aims of the security developments in Symbian OS v9.1 are to protect the integrity of the phone, provide extra control over user billable events and to prevent malicious software corrupting executables and data. The aims have been met by:

- Providing platform security by a proactive system defence mechanism based on granting and monitoring application capabilities through Symbian Signed certification. The infrastructure allows applications to have private protected data stores.
- A proactive defence mechanism against malware. The platform security infrastructure uses a capability based model which ensures that sensitive operations, such as, modifying user data, making calls and using network connections, can only be accessed by applications which have been certified by an appropriate signing authority.
- Data caging; this allows applications to have their own private data protection. This allows applications a guaranteed secure data source. This can be used for applications, such as,

ecommerce. An application can access other directories marked as open but cannot access another application's private directory.

- Additional platform security includes; full encryption and certificate management, secure protocols (HTTPS, SSL and TLS) and WIM framework.

## EKA2 Kernel

- A new realtime kernel (EKA2) with guaranteed response times provides the basis for a robust and power-efficient phone. Predictable real time operation means that the OS will respond to interrupts, system and user threads within a known period. This means that no task in the system can prevent the OS from responding to key tasks.

- Support for multiple simultaneous IP connections.

## Development and testing

- Provides new customization and configurability options for the operating system.
- Symbian OS is built using the ARM RVCT 2.1 compiler. This compiler is compliant with the ARM EABI standard. This allows compatibility with the latest ARM compilers and reduces the Symbian OS footprint while enhancing performance.
- Developing for Symbian OS - native system and application development in C++, supported by CodeWarrior and shortly Eclipse-based IDEs (. Java MIDP 2 supported by all mainstream Java tools. PC-hosted emulator for general development.

## UIQ 3.0

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The new UIQ 3.0 platform offers support for multiple form factors on the same code base and ease of operator configuration.

UIQ 3.0 is based on Symbian OS v9.1 and is equipped to meet the various demands from phone manufacturers, network operators and end users.

- UIQ 2.0 and 2.1 were delivered with flip open design only. UIQ 3.0 provides a UI design for flip closed use with selection keys as well as still supporting flip open input. The flip open UI and the new flip closed alternative are built on the same code base. Additional UI designs, for other form factors, can easily be created.
- Customization of software is important. UIQ 3.0 offers new features for operator customizations and branding. Sony Ericsson will use these fea-

tures to configure P990i to meet requirements from network operators. The same customizations can then be re-used on other UIQ phones with different form factors.

- Developers can utilize the new features of UIQ 3.0 to easily develop applications.
- The SDK (Software Developers Kit) can be used to expand these applications or create new ones. Building blocks, layout managers and a wide range of controls, such as menus and dialogs, make it easier to design applications for UIQ. Using these tools also gives the applications the UIQ look and feel which users are familiar with. The application framework and system services are the basis of the UI platform.

## Java™

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P990i supports two kinds of Java™ ME CLDC 1.1 and CDC 1.0:

CLDC 1.1 JARs supported:



- JTWI 1.0 (JSR-185) consisting of CLDC (Connected Limited Device Configuration) 1.1 HI (JSR-139), MIDP 2.0 (JSR-118), WMA 1.1 (JSR-120).
- PDA PIM and File Access (JSR-75).
- Bluetooth™ wireless technology (JSR-82).
- Wireless Messaging API 2.0 (JSR-205).
- Web Service (JSR-172).
- Mobile Media API (JSR-135).
- Mobile 3D Graphics (JSR-184).

- Nokia UI API 1.1.

CDC 1.0 JARs supported:

- Foundation profile 1.0 (JSR-46).
- Personal profile 1.0 (JSR-62).
- PDA File Access (JSR-75).

Standard JAVA applications can run in both flip open and flip closed.

## Chinese models in detail

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This section provides more information about the differences and extra features of the Chinese models, that is, the P990i Chinese and P990c, when compared to the non-Chinese model (P990i Standard).

### Product Name and Languages

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Market	Product Name	Default Language for UI and Dictionary	Alternative UI Language
Mainland China	P990c	Simplified Chinese (ZS)	English (EN)
Hong Kong	P990i	Traditional Chinese Hong Kong (ZH)	English (EN)
Singapore	P990i	English (EN)	Simplified Chinese (ZS)
Taiwan	P990i	Traditional Chinese Taiwan (ZT)	English (EN)

All Chinese models have both the default and alternative language stored in memory. These cannot be deleted.

There are basically two written languages of Chinese; Traditional Chinese and Simplified Chinese.

Traditional Chinese is used in Taiwan and Hong Kong. Simplified Chinese is used in China and Singapore.



## Input Methods

Market	Product Name	Keypad keys	Default Input Method	Alternative Input Method	Flip keyboard
Mainland China	P990c	Strokes, Latin	Pinyin	Strokes	QWERTY (Pinyin)
Hong Kong	P990i	Strokes, Latin	Strokes	Pinyin	QWERTY (Pinyin)
Singapore	P990i	Strokes, Latin	Pinyin	Strokes	QWERTY (Pinyin)
Taiwan	P990i	BoPoMoFo, Strokes, Latin	BoPoMoFo	Strokes	QWERTY

Strokes is an input method based on the graphical building blocks of Chinese characters.

Pinyin is a way of phonetically describing a Chinese character using the Latin alphabet. An example of this is Bei Jing, where Bei is the pronunciation of one character and Jing that of another.

BoPoMoFo is a method of describing a Chinese character using a set of approximately 37 phonetic characters. This method is also known as Zhuyin and is mainly used in Taiwan.

Predictive Text Input: if switched on, as the user enters text, the word or next word prediction suggestions are presented on the screen. User can input one sentence without any interruption.

Initial phonetic and mixed initial phonetic pinyin input are also supported.

Fuzzy pinyin can be supported in the simplified pinyin input method.

Conversion from Simplified Chinese to Traditional Chinese is supported in mainland China and Singapore load modules. Conversion from Traditional Chinese to Simplified Chinese is supported in the Hong Kong and Taiwan modules.

## Handwriting Recognition

The user enters text directly on the screen. The shapes drawn are shown until the character is interpreted. Simplified and Traditional Chinese are supported on the relevant versions.

The user can select single character recognition or Multi-character recognition which can act on Chinese text input and English text input simultaneously.

Recognition speed can be adjusted in the Chinese handwriting set-up. There are ten different speed settings for the user to select.

Time out speed recognition, pen colour and size can be set by the user.

Spaces, backspaces, new lines and symbols can be input easily via the extra buttons on the keyboard.

## Hardware keyboard character input

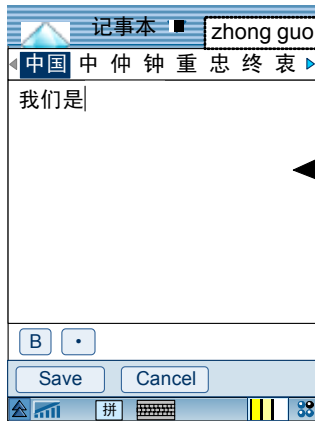
The QWERTY keyboard in Mainland China, Hong Kong and Singapore supports pinyin input. The pinyin input method can be activated by pressing the shift key and space keys together.



## Chinese phrase input

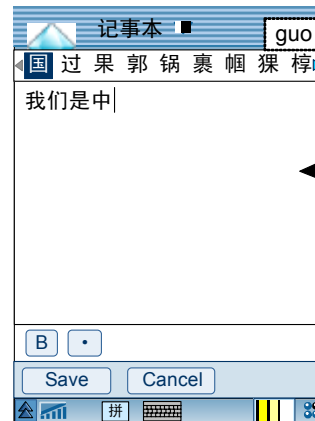
As the user inputs pinyin, candidates will be changed according to the changing pinyin. When the user selects the candidate the pinyin in the input area will disappear.

If the pinyin is too long and exceeds the whole length, the corresponding pinyin in front will disappear while the user continues to input pinyin. The candidates in the candidates area are the first pinyin candidates.



- If prediction is on, after the user selects the candidate, the candidates area will refresh to be the predication characters according to the previous selected candidate.
- If prediction is off, after the user selects the candidate, the candidates in the candidates area will disappear.
- If the user holds the , and . keys, the Chinese symbol/punctuation table will appear and both the pinyin in the input area, and the candidates in the candidates area, will disappear.
- If the user uses the stylus to move to a different point in the display area, the input area and the candidates area status will remain unchanged.

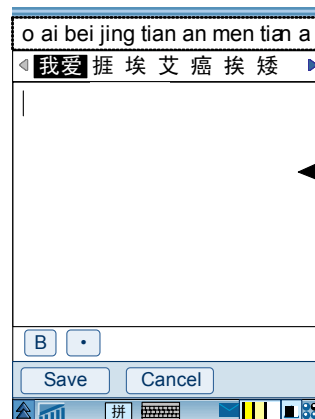
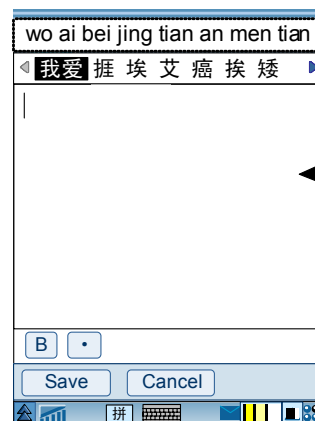
When the required phrase is not available in the candidates area, the user can select the characters one by one. When the user selects individual characters, the corresponding pinyin in the input area will disappear and the next characters' candidates will appear.



Note: If the current input mode is HWR which supports interaction between HWR and HWK, then the candidates and Pinyin will disappear if there is no action in the candidates area for 5 seconds. However this will not happen if the current input mode is HWK only.

## Chinese sentence input

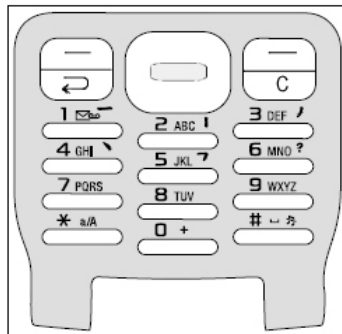
A similar process is followed when entering a Chinese sentence, as illustrated below:



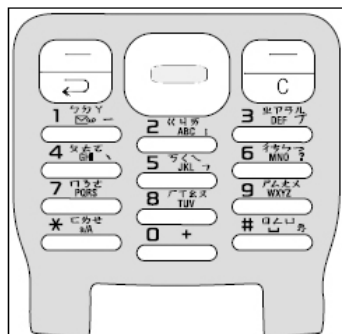
## Flip closed character Input

There are two different flip designs, one with Strokes and the other with BoPoMoFo characters. Latin characters (a, b, c...) are included on both. Elements are entered directly via the defined keys using ambiguous pinyin text input, ambiguous BoPoMoFo text input, or stroke input (5 strokes plus 1 wild card).

This is the Strokes keypad that is used in mainland China, Hong Kong and Singapore markets. Note the standard strokes on keys 1 to 6.



This is the BoPoMoFo keypad that is used on the Taiwan market version. The additional Zhuyin symbols are on keys 1 to 9 and also the \* and # keys.

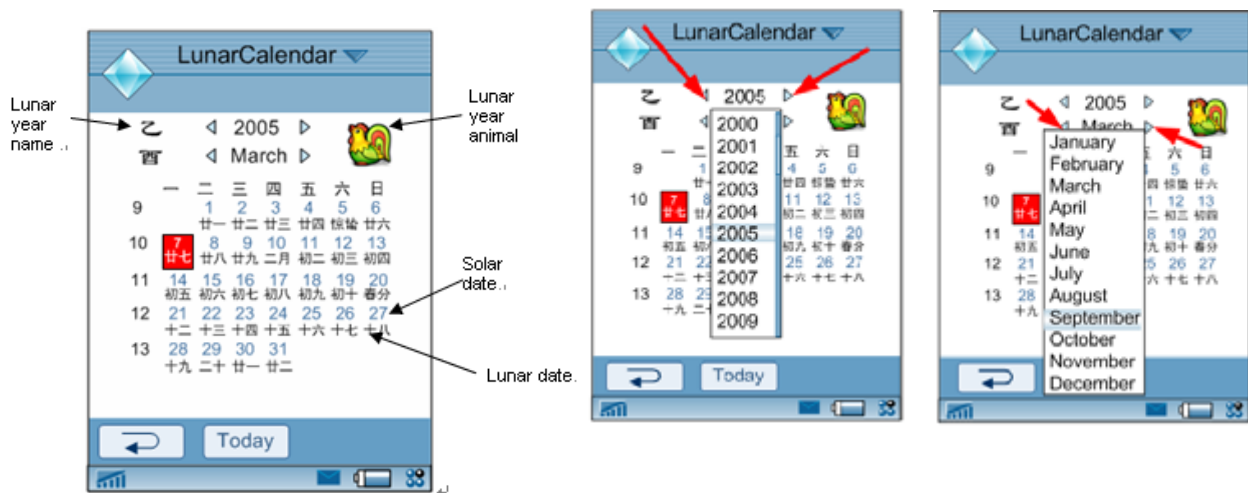


## Virtual Keyboard

A virtual keyboard is provided to enable the user to input elements directly by clicking the pinyin letter. The top area is where the selected characters are displayed to make up the sentence. The middle area is the element display area showing the selected element(s). Candidates are displayed within a candidate area (the lower area). The candidate area can also be expanded into multiple rows.

# Lunar Calendar

The Chinese models have two calendars: one based on the Western solar calendar system and one based on the Chinese lunar system. Before the solar calendar was adopted, China exclusively followed a lunar to decide the times of planning, harvesting and festival occasions. Today the solar calendar is used for most practical matters of daily life but the lunar calendar is still important because it determines numerous seasonal holidays such as the Traditional New Year.



The default date of the Lunar Calendar is today's date.

In the year choice list, user can select the year between 1901-2100. In the month list, user can select a month.

# Chinese Dictionary

- The offline dictionary is used. It contains an English-Chinese and Chinese-English dictionary. The word database is preset in the phone.

# Contacts

Contacts can be looked up directly by entering a name in the context bar. The option is available in both flip open and flip closed modes. Chinese names support the Chinese character incremental searching and Latin names support the Latin char-

acter incremental searching. All field searching is also supported both in Latin names and Chinese names.

## Key features

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- The Chinese font is a supported scalable font;
- The Chinese font database can support the extended font library GB18030 in all Chinese markets;
- Chinese text input supports next word predictive text input and phrasal text input via eZiText and eZiTap;
- The frequency of used words remembered by the database can be set by the user. The user can also send the new words to the “my words” database;
- Pinyin text input is added to the QWERTY keyboard text input for both simplified Chinese and traditional Chinese.



# P990i consumer package

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The exact contents of the P990i package depend on the localization.

The basic contents are as follows:

- P990i with stylus
- Battery
- Travel charger
- Desk Stand
- USB Cable
- Stereo headset
- Strap
- Extra stylus
- Memory Stick PRO Duo™
- Memory Stick™ adapter
- Flip replacement cover
- User documentation package
- Sony Ericsson PC Suite CD

## Accessories

Accessories	Product name
<b>Chargers/Desk Stands</b>	
Micro Travel Charger	CMT-60
Desk Stand	CDS-60
Charger	CST-60
<b>Car</b>	
Cigarette lighter adapter	CLA-60
Bluetooth™ Car Handsfree	HCB-300
Bluetooth™ Car Handsfree with Display	HCB-700
Dedicated Car Holder for P990i	HCH-XX
Universal Car Holder	HCH-60
<b>Handsfree</b>	
Portable Handsfree	HPB-60 and HPE-60
Sport Portable Handsfree	HPS-60
Bluetooth™ Handsfree	HBH-200
Akono™ Headset	HBH-300
Akono™ Headset	HBH-600
Akono™ Headset	HBH-602
Akono™ Headset	HBH-605
Akono™ Headset	HBH-608
Akono™ Headset	HBH-610
Akono™ Headset	HBH-620
Akono™ Headset	HBH-660
Akono™ Headset	HBH-662
Akono™ Headset	HBH-670
<b>Entertainment</b>	
Stereo Portable Handsfree for kitting	HPM-61
Ultra Style Stereo Portable Handsfree	HPM-70
<b>Connectivity</b>	
USB Cable	DCU-60



<b>Imageware</b>	
Executive Case	IEC-20
Stylus Pack	ISP-XX
<b>Concepts</b>	
Quick Install BT Car Kit	TBD

## Technical specifications

### General technical data

Product name	P990i
System	Tri-band GSM Release 99 recommendations. GSM 900 (CTR 19 and CTR 20) GSM 1800 (CTR 31 and CTR 32) EGSM and WCDMA FDD mode supported UMTS 2100 Latin America 1800, 1900 and e-GSM mode supported. UMTS
Speech coding	HR, FR, EFR, AMR supported where available, for high speech quality.
Operating system	Symbian OS v9.1 UIQ 3.0
Processor	AMR
GSM SIM/ UMTS USIM card	GSM SIM - GSM 11.11, UMTS USIM - 3GPP™ TS 31.102. Small plug-in card, 1,8 V and 3 V.
Internal memory size	60 MB*. Actual free memory may vary due to phone pre-configuration.
Additional storage	64 MB Memory Stick PRO Duo™, plus adapter, supplied. Memory Stick PRO Duo™, up to 8 GB size supported.
Data transfer speeds	High speed 12 Mbps
Length	114 mm
Width	57 mm
Thickness (thinnest point/keypad area)	21 mm
Thickness (thickest point/display area)	25 mm

Weight	155 g
Antenna	Built-in
Colours	Premium silver
Battery	BST-33, capacity 950 mAh

## Screen

Display type	TFT
Display size	2.76"
Pixel size	240 x 320
Colour resolution	262 k
Screen surface	Touch-sensitive
Illumination	Variable intensity backlight

## Performance and technical characteristics

Dimension	GSM 900/ E-GSM 900	GSM 1800	GSM 1900	WCDMA
Frequency range (MHz)	TX: 880 – 915 RX: 925 – 960	TX: 1710 – 1785 RX: 1805 – 1880	TX: 1850 – 1910 RX: 1930 – 1990	TX:1920 – 1980 RX:2110 – 2170
Channel spacing	200 kHz	200 kHz	200 kHz	5 MHz with 200 kHz channel rasters
Number of channels	174 Carriers *8 (TDMA)	374 Carriers *8 (TDMA)	299 Carriers *8 (TDMA)	277
Modulation	GMSK	GMSK	GMSK	QPSK
TX Phase Accuracy	< 5° RMS Phase error (burst)	< 5° RMS Phase error (burst)	< 5° RMS Phase error (burst)	Error Vector Mag- nitude: <17.5%
Duplex spacing	45 MHz	95 MHz	80 MHz	190 MHz
Frequency stability	+/- 0.1 ppm	+/- 0.1 ppm	+/- 0.1 ppm	+/- 0.1 ppm
Voltage operation (nominal)	3.6 V	3.6 V	3.6 V	3.6 V
Transmitter RF power output	33 dBm Class 4 (2 W peak)	30 dBm Class 1 (1 W peak)	30 dBm Class 1 (1 W peak)	24dBm Class 3 (0.25 W peak)
Transmitter Output impedance	50 Ω	50 Ω	50 Ω	50 Ω

Dimension	GSM 900/ E-GSM 900	GSM 1800	GSM 1900	WCDMA
Transmitter Spurious emission	< -36 dBm up to 1 GHz < -30 dBm over 1 GHz (according to GSM spec)	< - 30 dBm (according to GSM spec.)	< - 30 dBm (according to GSM spec.)	< -36 dBm up to 1 GHz < -30 dBm over 1 GHz (according to 3GPP™ spec)
Receiver RF level	Better than – 102 dBm	– 102 dBm	Better than – 102 dBm	Better than -106.7 dBm @ 12.2 kbps CS voice
Receiver RX Bit error rate	< 2.4%	< 2.4%	< 2.4%	< 0.1%

## Current consumption, talk and standby times

Talk time	Up to 9 hours (GSM) Up to 3 hours (UMTS)
Operating time	Up to 6 hours read and edit email with back light on (GSM and UMTS)
Operating time	Up to 9 hours listening to music using the headset (GSM and UMTS)
Standby time	Up to 340 hours (GSM) Up to 300 hours (UMTS)

## USSD technical data

Feature	Support
USSD support	GSM Phase 1/2 (Cross-phase compatibility). GPRS behaviour according to class B.
Mode support -mode	UI-mode supported. SAT initiated USSD supported.
UI-mode details	<ul style="list-style-type: none"> <li>It is possible to scroll the text up and down in USSD messages.</li> <li>It is possible to highlight embedded numbers and take actions accordingly.</li> </ul>

## GPRS technical data

Dimension	Support
Compatible GPRS and SMG specifications	Release 99 according to ETSI specification.
Data rates	Multislot class 10 supported (4+2) CS-1, CS-2, CS-3, CS-4 9,050 bps, 13,400 bps, 15,600 bps, 21,400 bps supported (network-dependent).
Medium Access Modes	Dynamic allocation
Support of Packet Control Channels (PBCCH/PCCCH)	Yes
Network operation mode	NOM I, II, III
Support of GPRS/CS combined procedures	Yes
Network control mode	NC0 and 2
Support of access in 2 phases	Yes
Support of PRACH on 11 bits	Yes
Support of GPRS re-selection C31/C32	Yes
Support of static and dynamic addressing	Yes
Support of power control Uplink and Downlink	Uplink = yes, Downlink is a network feature.
Support of ciphering algorithms	GEA1, GEA2
Support of compression algorithms	Yes, V42bis and IP header compression.
Mode of operation	Class B and Class C modes of operation supported.
R Reference point	Physical layer: Support of RS232 PPP is supported as L2 layer in the R reference point Authentication algorithms PAP, CHAP supported
IP connectivity	PDP type IP is supported IP termination in mobile or TE (laptop, PDA) supported
PDP context	10 PDP context descriptions stored in mobile PDP context description is edited via application in mobile, AT-command or via OTA Simultaneous PDP contexts are supported, maximum 2.

Dimension	Support	
SIM	GPRS aware, as well as non-GPRS aware; SIM cards are supported.	
AT commands supported	AT+CGDCONT - DEFINE PDP CONTEXT AT+CGQREQ - Quality of Service Profile (REQUESTED) AT+CGQMIN - Quality of Service Profile (Minimum Acceptable) AT+CGATT - PACKET DOMAIN SERVICE ATTACH OR DETACH	AT+CGACT - PDP CONTEXT ACTIVATE OR DEACTIVATE AT+CGDATA - ENT

## GPRS maximum data rates (Kpbs)

		CS-1 9.05 Kbps	CS-2 13.5 Kbps	CS-3 15.6 Kbps	CS-4 21.4 Kbps
4 + 1	Rx	36.2	53.6	62.4	85.6
	Tx	9.05	13.4	15.6	21.4

## HSCSD maximum Data Rates (Kpbs)

		9.6 Kbps per timeslot	14.4 Kbps per timeslot
2 + 1	Rx	19.2	28.8
	Tx	9.6	14.4

## Keypad

- 16 keyswitches on hinged/removable flip.
- Jog Dial, 3-way: up, down and inwards.
- Browser button to switch to integrated browser.
- Camera button – switches to camera viewfinder.
- On/Off button.
- Music player button to switch to the music player.
- Back button to switch back a view.
- Screen lock button to turn on phone lock.

## Input

Flip closed	Multitap Numeric keypad on flip Latin characters on number keys Zi-Corp eZiText Word completion Next word completion
Flip open	QWERTY keyboard natural handwriting over the whole screen on-screen keyboard Zi-Corp eZiText word completion Next word completion

## Third party application support

**Note:** The list below may be subject to future updates, that is, new applications may be added, others removed.

Application	
Abakus – Simple calculator, engineering calculator, unit converter, and mortgage calculator in one.	Supplied on the memory card Try and buy
AccuWeather – Offers access to a wealth of world-wide weather. Detailed current conditions give the user a look at what the weather is currently doing for their location, or for any of thousands of locations around the world.	Supplied on the memory card Try and buy
ACM (Advanced Call Manager) – Ultra-fast recognition of remote callers.	Supplied on the memory card Try and buy
Audible – Digital audio books, newspapers and programs from Audible, the Internet's leading provider of spoken word audio.	Supplied on the memory card Try and buy
Blogger – Allows the user to easily send photos, images and text straight to the user's Blog while on-the-go.	Supplied on the memory card Try and buy

<b>Application</b>	
Chess Professional – Multi award winning chess application, renowned for its superb playability for players of all levels.	Supplied on the memory card Try and buy
Crystal Arabic (Psiloc) – Used to create, send and receive notes, sheets, documents, calendar entries, email, messages, contacts, and more in the Arabic language.	Supplied on the memory card Try and buy
Crystal Hebrew (Psiloc) – Used to create, send and receive notes, sheets, documents, calendar entries, email, messages, contacts, and more in the Hebrew language.	Supplied on the memory card Try and buy
Crystal Hindi (Psiloc) – Used to create, send and receive notes, sheets, documents, calendar entries, email, messages, contacts, and more in the Hindi language.	Supplied on the memory card Try and buy
Crystal Thai (Psiloc) – Used to create, send and receive notes, sheets, documents, calendar entries, email, messages, contacts, and more in the Thai language.	Supplied on the memory card Try and buy
Ericsson Mobile Organizer – Easy-to-use access for enterprise users to corporate email and other PIM data on the move.	Supplied on the memory card Try and buy
Exchange ActiveSync – Secure, wireless and direct push synchronization with Microsoft Exchange Server 2003.	Supplied on the memory card Free
Handy Day – Personal assistant keeping track of appointments and tasks. Quick and convenient access to applications, files and contacts.	Supplied on the memory card Try and buy
Handy Expense – Where is the money gone during business trips. Handy Expense keeps track of them, and also compiles expense reports.	Supplied on the memory card Try and buy
Handy Safe – A perfect assistant for secure and convenient management of data, like passwords, credit card details, user names, accounts, Web pages, and insurance policies.	Supplied on the memory card Try and buy

<b>Application</b>	
Hijri Calendar – Full-featured mobile calendar that works based on both the Gregorian and Islamic Hijri calendars at the same time.	Supplied on the memory card Try and buy
IM+ – Five famous Instant Messaging (IM) services combined in one application: Yahoo, Google Talk, AIM, MSN and ICQ.	Supplied on the memory card Try and buy
IntelliGolf Birdie Edition – "Best Sports Software". Includes golf scoring, wagering, shot tracking, and wireless access to 20,000+ course scorecards worldwide!	Supplied on the memory card Try and buy
LocationFree TV – Allows the user to enjoy video content, both at home and on the go. To make use of LocationFree, a separate device called LocationFree Base Station is needed.	Supplied on the memory card Try and buy
Mahjongg – Single player game that probably originated in Asia. The objective of the game is to remove all the tiles from a layout.	Supplied on the memory card Try and buy
McAfee Firewall Mobile – Protection against hackers, data-stealing applications and identity theft.	Supplied on the memory card Try and buy
McAfee VirusScan Mobile – The leading solution for real-time protection against viruses, worms, Trojans and so on.	Supplied on the memory card Try and buy
Mobipocket Reader – Transforms the phone into a universal digital text reader, with features for adjusting font size, creating annotations, looking up words for translation, and much more.	Supplied on the memory card Free
PhotoWord – The world's first cell-phone dictionary. Uses the camera to read and translate text.	Supplied on the memory card Try and buy
SlovoEd – Explanatory dictionary offering easy-to-use interface, rapid access and precise translations.	Supplied on the memory card Try and buy
SmartRoaming client – Lets the users connect wherever they are, whenever they want and keeps them connected as they move across several networks.	Supplied on the memory card Try and buy



<b>Application</b>	
VPN Manager – Secure mobile access to corporate email, intranet content and enterprise applications.	Supplied on the memory card Free
Wayfinder Navigator – Together with a Bluetooth GPS, turns the phone into a top-of-the-line GPS Navigator. Editor's choice Mobile Magazine 2005.	Supplied on the memory card Try and buy
Wisepilot – Innovative navigation system with maps, voice instructions, and travel information.	Supplied on the memory card Try and buy
WorldMate – World clock, global weather forecasts, comprehensive flight schedules for over 800 airlines, and much more.	Supplied on the memory card Try and buy
Zingles – Also known as Sudoku, Zingles is a highly addictive logic puzzle game.	Supplied on the memory card Try and buy

## Camera – 2 megapixel camera

<b>Facts and figures</b>	
Picture sizes (resolution) Megapixel camera	QVGA (320 x 240) VGA (640 x 480 pixels) Megapixel (1280 x 960 pixels) UXGA (1600 x 1200) QCIF (176 x 144 pixels) and SQCIF (128 x 96 pixels) - applicable only for video recording and telephony, not for still images.
Colour depth	18-bit, 262 k colours
Camera memory	Using phone memory or Memory Stick™.
Digital zoom	2.5x
Photo light	Yes
Auto focus	Yes
Macro Mode	Yes
Picture storage capacity	Stores up to 270 pictures 2 megapixel pictures (when each picture is less than 0.5 MB) 150 are stored internally and 120 are stored on the supplied Memory Stick.

## Camera – video call camera

Facts and figures	
Picture sizes (resolution) Megapixel camera	QCIF (176 x 144 pixels) and SQCIF (128 x 96 pixels) - applicable only for video recording and telephony, not for still images.
Colour depth	TBD

## Media player

File Format	Video: MP4 (MPEG4 and AAC-LC), 3GP (H.263 AMR NB and AAC LC) and Real Audio Video Audio: AU, iMelody, AAC, AMR, MP3, RMF, DLS, Real Audio, G-MIDI level 1 with 40 voices polyphony, WAV (up to 16 KHz sample-rate), XMF, Midi and SP-Midi.
Streaming transport	RTSP according to 3GPP™
Video decoding	MPEG-4 Visual Simple Profile Level 0-3 H.263 Profile 0 Level 10 H.263 Profile 3 Level 10
Audio decoding	AAC-LC, AMR-NB, AU, iMelody, Midi, SP-Midi, MPEG layer 3, RMF, WAV, XMF, DLS, Real Audio 9, eACC+ and ACC+.
Features	Automatic loop of songs in folder. Automatic pause on telephone call. Playlists.
Music storage capacity	Stores up to 2 hours of music (with ACC 128 Kbps coded files). 75 minutes is stored internally and 60 minutes is stored on the supplied Memory Stick.

## Pictures

Formats	JPEG, BMP, GIF (including animated), PNG, MBM, and WBMP.
Sharing via	Wi-Fi, IR, Bluetooth™ wireless technology, MMS, Email, PC file transfer, Memory Stick Duo™, Memory Stick PRO Duo™, USB

## Image decoders

Decoder	Details	Size	Colour depth	File format
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GIF	87a/89a		
JPEG	ISO/IEC JPEG <ul style="list-style-type: none"> <li>• Baseline DCT</li> <li>• Progressive DCT</li> <li>• Non-differential</li> <li>• Huffman coding</li> <li>• Symbol 'SOF2'</li> </ul>	Megapixel	<ul style="list-style-type: none"> <li>• JFIF v1.02</li> <li>• EXIF</li> </ul>
BMP	The bitmap image format used by Windows®.	XRAM depend-ent, default is VGA.	18-bit
WBMP			
PNG			

## Image encoders

Decoder	Details	Size	Colour depth	File format
GIF	89a			
JPEG	ISO/IEC JPEG <ul style="list-style-type: none"> <li>• Baseline DCT</li> <li>• Non-differential</li> <li>• Huffman coding</li> <li>• Symbol 'SOF0'</li> </ul>	Megapixel		JFIF v1.02
BMP	The bitmap image format used by Windows®.	XRAM depend-ent. Default is VGA.	18-bit	
WBMP				

## Short message service

Feature	Support in the P990i
SMS Centre Number	It is possible to pre-record the SMS Centre Number.
Pictures	It is possible to insert a picture or an icon into the text message. EMS compliant mobile phones will be able to see the picture correctly.
Input methods	QWERTY Keyboard, on-screen keyboard, touch screen, predictive text input and multitap.
Reply to messages	It is possible to reply to received messages by MMS, SMS or phone call.
Copy, cut and paste words	Yes

Feature	Support in the P990i
Teaching of predictive words that are not in the predictive dictionary	Yes
Possibilities when creating a message:	
save a sent message in a “sent items” folder	Yes
insert a line in the message	Yes
assign a validity period to the message	Yes
print via IrDA	No
use pre-defined messages	No
Possibilities when receiving a message:	
reply to the sender	Yes
forward the message	Yes
save the message on SIM	No
get delivery time and date	Yes, but not via messaging
print via IrDA	No
Possibilities of the previously sent message:	
delivery report of the message	Yes
forward the message	Yes
save the message on SIM	Yes
know the remaining capacity storage	Yes
print via IrDA	No
Possibilities of the previously received message:	
reply to the sender	Yes
save the message in the Inbox	Yes
forward the message	Yes
know the remaining capacity storage	Yes
Supported ways for replying to a received SMS:	
via SMS	Yes
via phone call (set up a call to the number contained in the message body)	Yes
via USSD session	No

Feature	Support in the P990i
Possibility to offer the user the ability of sending an SMS to a list of recipients	Yes, using phonebook groups or entering multiple numbers manually.
Possibility to write an email address as a recipient address	No
SMS storage	In phone and SIM.
Nokia Picture Messaging	No

## Enhanced message service

Feature	Support in the P990i
Level of compliance supported by the phone regarding the specifications described in release 99.	Enhanced Messaging Service (EMS) according to the standard 3GPP™ TS 23.040 v4.3.0, with the addition of the ODI feature from 3GPP™ TS 23.040 v5.0.0.
Number of messages that the phone is able to handle to generate a concatenated message	TBD
Capacity storage	TBD
Outgoing messages	It is possible to: <ul style="list-style-type: none"> <li>• see how many short messages an EMS message consists of before sending it.</li> <li>• choose whether to send the message or not after writing it.</li> </ul>
Incoming messages	<ul style="list-style-type: none"> <li>• A signal is heard once all parts of the message have been received.</li> <li>• It is possible to re-use the content of an EMS message. Sounds, pictures, and animations can be inserted in a new message, if the object is not protected using ODI.</li> </ul>
Concatenated messages	A receipt is received in the phone when all parts of a concatenated message have been delivered.
Insert objects	It is possible to add pictures, animations and sounds to an EMS message.
Text formatting	<ul style="list-style-type: none"> <li>• Centred, left and right aligned text.</li> <li>• Small, normal and large font size.</li> <li>• Bold, italic, underlined and strikethrough style.</li> </ul>
Sounds	Chimes high, chimes low, ding, tada, notify, drum, claps, fanfare, chords high, chords low.
I-melody	Yes, version 1.2.

Feature	Support in the P990i
Melodies	It is possible to: <ul style="list-style-type: none"> <li>• send and receive melodies via EMS, if the melodies are not protected by copyright.</li> <li>• download melodies and commercial tunes.</li> <li>• create melodies.</li> </ul>
WBMP	Yes
Picture sizes	16 x 16 mm, 32 x 32 mm, variable size in black and white.
Pictures	It is possible to: <ul style="list-style-type: none"> <li>• edit pictures.</li> <li>• send and receive pictures via EMS, if the pictures are not protected by copyright.</li> <li>• create pictures.</li> <li>• download pictures.</li> <li>• receive pictures in enhanced messages originated by service providers.</li> </ul>
Animations	The phone supports the following animations: I am ironic, I am glad, I am sceptic, I am sad, WOW!, I am crying. Plus the other nine animations defined in 23.040 v4.3.0. It is possible to send and receive animations.
TP-PID field value given by the phone before sending an EMS message	0x00

## Multimedia message service

Feature	Support in the P990i
Support of MMS protocol stack version	1.2
MMS/circuit switched parameters and MMS/packet switched parameters placement	MMS is bound to a Data Account. A Data Account contains either circuit switched parameters or packet switched parameters.
Possibility to pre-configure the MMS parameters in factory	<ul style="list-style-type: none"> <li>• MMS circuit switched: Yes</li> <li>• MMS packet switched: Yes</li> </ul>
Possibility to configure the MMS parameters by OTA provisioning	<ul style="list-style-type: none"> <li>• MMS circuit switched: Yes</li> <li>• MMS packet switched: Yes</li> </ul>
Possibility for all the parameters from the parameters set to be OTA provisioned at the same time	<ul style="list-style-type: none"> <li>• MMS circuit switched: Yes</li> <li>• MMS packet switched: Yes</li> </ul>

Feature	Support in the P990i
Possibility for only one parameter from the parameters set to be OTA provisioned	Using Device Management: <ul style="list-style-type: none"> <li>• MMS circuit switched: Yes</li> <li>• MMS packet switched: Yes</li> </ul> Using Client Provisioning: <ul style="list-style-type: none"> <li>• MMS circuit switched: No</li> <li>• MMS packet switched: No</li> </ul>
OTA provisioning solution	OMA Device Management and OMA Client Provisioning supported
MMS User Agent functional entity will be a separate entity from Web browser:	Yes
MMS User Agent support	OMA UAPProf.
Supplier indication of realized interoperability tests between its MMS User Agent and MMS Relay/Server from other suppliers	Yes
Support of a standard or a proprietary procedure for OTA provisioning of MMS parameters	OMA Device Management and OMA Client Provisioning
Functionalities that the user is able to set during message composition:	<ul style="list-style-type: none"> <li>• message <i>subject</i></li> <li>• MSISDN recipient address</li> <li>• <i>email</i> recipient address</li> <li>• message Cc recipient(s) address(es)</li> <li>• <i>delivery report</i> request</li> <li>• <i>read-reply</i> report request</li> <li>• <i>message</i> priority</li> <li>• <i>validity</i> period</li> </ul>
From where can the user insert multimedia elements into multimedia messages:	<ul style="list-style-type: none"> <li>• terminal memory</li> <li>• directly from camera</li> </ul>
Supplier indication if MMS User Agent will be able to handle a network-based address book	No
Possibility for sent messages to be memorized into a folder in phone memory	Yes
Actions that the user can perform after message notification:	<ul style="list-style-type: none"> <li>• retrieve the message immediately</li> <li>• defer message retrieval</li> <li>• reject message</li> </ul>
Actions that the user can perform after message retrieval:	<ul style="list-style-type: none"> <li>• reply to the sender of the message</li> <li>• reply to the sender and to Cc people</li> <li>• forward the message</li> <li>• delete the message</li> <li>• save message into terminal</li> </ul>

Feature	Support in the P990i
Multimedia codecs/formats supported for audio	AMR, MP3, AAC, WAV Depending on content class/creation mode settings, the following formats are also supported: AAC-LC AMR-NB AMR-WB SP-MIDI XMF DLS Real Audio
Multimedia codecs/formats supported for video	MP4, H263 Depending on content class/creation mode settings, the following format is also supported: Real Video
Multimedia codecs/formats supported for image	Baseline JPEG, wbmp, SVG, GIF 89a
MMS User Agent provides:	<ul style="list-style-type: none"> <li>• text formatting facilities (only text size)</li> <li>• coloured text/background (Viewer/player supports coloured text and background.)</li> <li>• QWERTY Keyboard, on-screen keyboard, touch screen, predictive text input and multitap.</li> </ul>

## Speech coding

Dimension	Full rate	Enhanced full rate
Type	RPE/LPC with LTP, AMR	ACELP, AMR
Bit rate	13.0 kbps	12.2 kbps
Frame duration	20 ms	20 ms
Block length	260 bits	244 bits
Class 1 bits	182 bits	
Class 2 bits	78 bits	



## Bluetooth technical data

Dimension	Support in the P990i
Bluetooth capability statement	This phone is manufactured to meet Bluetooth Specification 2.0
Bluetooth functions	Dial-up Networking Profile. Generic Access Profile. Generic Object Exchange Profile. Headset Profile. Object Push Profile. Serial Port Profile. Synchronization Profile. SyncML OBEX binding. Basic Imaging Profile. Basic Printing Profile. Handsfree Profile. File Transfer Profile. Human Interface Device (HID) Profile. Stereo Advanced Audio Distribution Profile. Advanced Audio/Video Remote Conference Profile. JSR-82 Java API. Personal Area Network Profile. Service Discovery Application Profile.
Connectable devices	All products supporting Bluetooth spec. 1.1, or higher, and at least one of the profiles above.
Coverage area	Varies due to radio performance on remote device and the occurrence of obstacles. Up to 10 metres (33 feet) or more in ideal conditions.
Transmission power	2 mW (3 dBm)
Frequency band	2.4 GHz - the unlicensed ISM band
Power consumption	GSM/UMTS host processor excluded: <ul style="list-style-type: none"> <li>• Standby, Bluetooth On mode: &lt;0.9 mA</li> <li>• Voice mode: 24 mA</li> <li>• Data mode average: 25 mA</li> </ul>
Data transmission rate	Up to 600 kbps asynchronous and up to 350 kbps synchronous from an application level.
Specific commands working with the SIM card	No

## SIM AT services supported

Service	Mode	Support
CALL CONTROL BY SIM		Yes
DATA DOWNLOAD TO SIM	Cell Broadcast SMS	Yes Yes
DISPLAY TEXT	Text of up to 240 characters (120 UCS2 coded).	Yes
	bit 1: 0 = normal priority	Yes
	1 = high priority	Yes
	bit 8: 0 = clear message after a delay	Yes
	1 = wait for user to clear message	Yes
GET INKEY	General: The GET_INKEY requires that the user confirms his/her choice	Yes
	bit 1: 0 = digits (0-9, *, # and +) only	Yes
	1 = alphabet set	Yes
	bit 2: 0 = SMS default alphabet	Yes
	1 = UCS2 alphabet	Yes
	bit 3: 0 = character sets defined by bit 1 and bit 2 are enabled	Yes
	1 = character sets defined by bit 1 and bit 2 are disabled and the Yes/No response is requested	Yes
GET INPUT	General: No. of hidden input characters	252
	bit 1: 0 = digits (0-9, *, # and +) only	Yes
	1 = alphabet set	Yes
	bit 2: 0 = SMS default alphabet	Yes
	1 = UCS2 alphabet	Yes
	bit 3: 0 = ME may echo user input on the display	Yes
	1 = user input not to be revealed in any way (see note)	Yes
	bit 4: 0 = user input to be in unpacked format	Yes
	1 = user input to be in SMS packed format	Yes
	bit 8: 0 = no help information available	Yes
	1 = help information available	Yes
LAUNCH BROWSER		Yes
MORE TIME		Yes
PLAY TONE		Yes

Service	Mode	Support
POLLING OFF		Yes
POLL INTERVAL		Yes
PROVIDE LOCAL INFORMATION	'00' = Location Information (MCC, MNC, LAC and Cell Identity)	Yes
	'01' = IMEI of the ME	Yes
	'02' = Network Measurement results	Yes
	'03' = Date, time and time zone (DTTinPLI)	Yes
	'04' - Language setting	Yes
	'05' - Timing setting	Yes
REFRESH	General: The reset option requests the user to wait while the phone restarts	Yes
	'00' =SIM Initialization and Full File Change Notification	Yes
	'01' = File Change Notification	Yes
	'02' = SIM Initialization and File Change Notification	Yes
	'03' = SIM Initialization	Yes
	'04' = SIM Reset	Yes
SELECT ITEM		Yes
SEND DTMF		Yes
SEND SHORT MESSAGE	bit 1: 0 = packing not required	Yes
	1 = SMS packing by the ME required	Yes
SEND SS		Yes
SEND USSD		Yes

Service	Mode	Support
SET UP CALL	General: Capability configuration	Yes
	Set-up speech call CallParty	No
	Subaddress DTMF support	Yes
	'00' = set up call, but only if not currently busy on another call	Yes
	'01' = set up call, but only if not currently busy on another call, with re-dial	Yes
	'02' = set up call, putting all other calls (if any) on hold	Yes
	'03' = set up call, putting all other calls (if any) on hold, with re-dial	Yes
SET UP EVENT LIST	'04' = set up call, disconnecting all other calls (if any)	Yes
	'05' = set up call, disconnecting all other calls (if any), with re-dial	Yes
	'00' = MT call	Yes
	'01' = Call connected	Yes
	'02' = Call disconnected	Yes
	'03' = Location status	Yes
	'04' = User activity	Yes
	'05' = Idle screen available	Yes
	'06' = Card reader status	Not Applicable
	'07' = Language selection	Yes
	'08' = Browser termination	Yes
	'09' = Data available	No
	'0A' = Channel status	No
SET UP IDLE MODE TEXT		Yes, 1 row of text is supported
SET UP MENU		Yes
TIMER MANAGEMENT		Yes
OPEN CHANNEL		No
CLOSE CHANNEL		No

Service	Mode	Support
RECEIVE DATA		No
SEND DATA		No
GET CHANNEL STATUS		No

## User interaction with SIM AT

### Display text

Text of up to 240 characters (120 UCS coded) is supported.

Text clearing times are 5-20 seconds and a 60 second timeout limit for the user to clear the text. 'Key' responses:

- 'Long Back' – Proactive session terminated by user.
- 'Back' – Backward move in proactive session.

Any other key clears the display if the command is performed successfully.

### Get inkey

Prompt for a one-character input. Pressing 'Ok' without entering a character gives warning message "Minimum 1 character". 'Key' responses:

- 'C' clears current character.
- 'Long Back' terminates the proactive session.
- 'Back' – Backward move in proactive session.
- 'OK' – Command performed successfully.

### Get input

Prompt for character input. The phone will refuse to accept further input when maximum response length is exceeded. UI Maximum Response lengths:

- Digits Only – 160 characters.
- SMS default alphabet characters – 160 characters, or 1530 characters if concatenation is activated.

- Hidden Characters (digits only) – 20 characters.

'Key' responses:

- 'C' clears current character.
- 'Long Back' terminates the proactive session.
- 'Back' – Backward move in proactive session.
- 'OK' – Command performed successfully.

### Select item

Scroll to highlight item for selection. 'Key' responses:

- Navigational key press down – Scroll down list.
- Navigational key press up – Scroll up list.
- Long 'Back' terminates proactive session.
- 'Back' – Backward move in proactive session.
- 'OK' – Command performed successfully.

### Send short message

Default message "Sending message, please wait" can be replaced for the Alpha Identifier text, or suppressed completely if a null text is provided. Default responses are "MESSAGE FAILED" or "MESSAGE SENT". 'Key' responses:

- Long 'Back' or 'Back' ends the proactive session.

## Set up call

If the ME is on a call when the command 'Set up Call', 'putting all other calls on hold' is sent, the user will see the text 'Setting up a call current call will be held'. If 'OK' is pressed the current call will be put on hold and the new call set up.

## Security

Data protection	SIM PIN (at power on) Device Lock (at power on and/or activated by screensaver)
Third party applications	Support for signed applications

## Browser technical data

Feature	Support in the P990i Opera browser
Opera version 8	HTML 4.0.1, XHTML 1.1, including mobile profile, WML 1.3, CSS 1 & CSS 2, including mobile profile, ECMAScript-232 3rd edition (equal to Java script 1.5) DOM level 1 & 2, Dynamic HTML.
Graphic Formats	GIF, animated GIF, JPEG, progressive JPEG, PNG,BMP, and WBMP,
Bookmarks	Yes, with folders and easy access to frequently visited pages.
Bookmark Export/Import	Yes, can be sent and received as vBookmark format via Infrared, Blue-Tooth, SMS, MMS and email.
Cache	Yes, small is 1Mb, large is 4Mb.
Character sets*	UTF-8 (Default), UTF-16, USASCII, Latin1, UCS2
Clear cache	Yes
Home page	Yes
Integrated Web search (built-in Google search)	Yes
Hyperlinks in Text	Yes, highlighted by inverse video.
Hyperlinks in Images	Yes, indicated by a frame.
Native support for SVG1.1	Yes
OMA download	Yes

Feature	Support in the P990i Opera browser
Frame support	Yes
OTA Support	Yes
Seamless zooming	Yes
Panning (the user can use pen motions to slide the page on the screen)	Yes
Security	TLS 1.0 and SSL 3.0,
OMA enabled browsing release	Support 2.2
User Agent Profiles	Support OMA UA Profile 1.1/2.0
	*) When creating WML applications, it is recommended that you always save the page contents as UTF-8, and that this is clearly indicated in the pages before publishing. This ensures that the contents of the application can be viewed, regardless of character sets used in gateways and the phone. All characters are not supported in all phones. The software version depends on which market the phone is associated to. Also, please note that the phone may not support input on a WAP Service which uses certain characters (languages), even if those characters are supported for browsing in the phone.
Internet profiles	Dynamic - up to 5 Internet profiles, each with its own settings.

## SyncML technical data

Feature	Support for Sync ML in the P990i
SyncML compliance	The phone is fully SyncML compliant (it passed SyncML Conformance testing).
Basic data formats	Contacts: vCard 2.1, Calendar: vCalendar 1.0, Tasks: vTodo 1.0, Notes: text/plain.
Possibility for operators to extend SyncML functionality	No
Possibility to synchronize other phones using SyncML	No
Transport method for SyncML messages	WSP (i.e. using a WAP connection), HTTP, OBEX (RS232, IR, USB, Bluetooth, Wi-Fi).
Synchronization application placement	Inside the phone

Feature	Support for Sync ML in the P990i
Possibility for the user to configure login parameters (e.g. username and password) to access the remote database	Yes
Configuration parameters that can be entered/modified by the user	Server URL, Server username, Server PWD, Paths to databases (Calendar, Contacts, Tasks) username and PWD for Databases, Databases to be synched (on/off), WAP Account, Sync Interval (hours).
Mechanisms used by the phone to capture changes made by the end user (i.e. how does the SyncML client in your phone know which changes were made to the address book)	It uses a change log where it marks the contact as updated.
Ability to deal with multiple servers	Yes
Ability to perform conflict resolution actions	No



# Terminology and abbreviations

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## **3GPP™**

3rd Generation Partnership Project.

## **AAC**

Advanced Audio Codec.

## **ALS**

Alternate Line Service. A system that allows a user to have more than one line allocated to a single SIM subscription.

## **AMR**

Adaptive Multi-Rate. A variable rate speech coding (compression) method selected by the 3GPP for the 3G evolution of the GSM phones.

## **API**

Application Programming Interface

## **AU, .au**

Format for audio data files.

## **AWT**

Abstract Windowing Toolkit. A Java™ Graphical User Interface library.

## **BAE**

Beatnik Audio Engine™

## **Bearer**

Path over which data flows. Specifically in CSD and HSCSD, the type of telephony link from the GSM network to the server - PSTN or ISDN.

## **Bluetooth™**

Bluetooth™ wireless technology is a secure, fast, point-to-multipoint radio connection technology. It is a specification for a small-form factor, low-cost radio solution providing links between mobile computers, mobile phones and other portable handheld devices, and connectivity to the Internet. Available from the Bluetooth Special Interest Group (SIG), [www.bluetooth.com](http://www.bluetooth.com).

## **Bookmark**

A URL and header/title stored in the phone, enabling the user to go directly to a Web page.

## **BMP**

Microsoft® Windows Bitmap. A graphics format defined by Microsoft supporting 1, 4, 8 or 18-bit colour depth. No compression, so files can be large.

## **bps**

Bits per second - rate of data flow.

## **BSS**

Basic Service Set. See WLAN Infrastructure Mode.

## **CB**

Cell Broadcast. Type of SMS message.

## **cHTML**

A version of HTML optimized for small devices.

## **CLDC**

Connected Limited Device Configuration. The J2ME 'configuration' implemented in P990i. CLDC specifies a runtime environment with specifically limited resources, suitable for memory-constrained devices.

## **CLI**

Calling Line Identity. Shows the number of the person calling you in your mobile phone display. P990i will also display the name and photograph of the caller if they are in Contacts.

You can then make an informed choice as to whether or not to take the call. Bear in mind that not all numbers can be displayed. To use this service, it must be supported by your network.

## **COM Port**

Defines a serial/RS-232 port within the Windows environment. May be physical (COM1 port on the rear of the PC) or virtual (COM5 port communicating with a PC card modem).

**CPHS Compliance**

The Common PCN Handset Specification (CPHS) is an industry standard that defines terminal and SIM functionality in addition to the standard GSM specifications.

**CS**

Circuit Switched. Connection from A to B which has a fixed bandwidth and is maintained over a period of time, such as, a voice telephone call.

**CS-1 to CS-4**

Coding Scheme. Determines the data rate per timeslot in GPRS.

**CSD**

Circuit Switched Data. CSD is a GSM service providing a CS data connection at a rate of 9.6 or 14.4 Kbps.

**CSP**

Customer Service Profile. on a SIM card will determine which menus on the phone are available to the user.

**CSS**

Cascading Style Sheet. A feature of browsers.

**DCIM**

Digital Camera IMages. The name of the root directory when storing images according to the Design rule for Camera File system (DCF) standard.

**DRM**

Digital Rights Management; controlling copying and distribution of contents, with respect to intellectual property rights.

**DTMF**

Dual Tone Multi Frequency. A method of coding digits as a combination of two audible tones.

**DUN**

Dial-Up Networking.

**ECML**

Electronic Commerce Modelling Language.

**EFR**

Enhanced Full Rate, speech coding. Provides better speech quality than HR or FR.

**e-GSM**

Extended GSM. New frequencies specified by the European Radio Communications Committee (ERC) for GSM use when additional spectrum is needed (Network-dependent). It allows operators to transmit and receive just outside GSM's core 900MHz frequency band. This extension gives increased network capability.

**EMS**

Enhanced Messaging Service. An extension of SMS enabling pictures, animations, sound and text formatting to be added to text messages. 3GPP has included EMS in the standards for SMS.

**ESS**

An Extended Service Set. See WLAN Infrastructure Mode.

**ETSI**

European Telecommunications Standards Institute. [www.etsi.org](http://www.etsi.org)

**Flip closed**

Used in this document to refer to P990i with the flip closed.

**FCC**

Federal Communications Commission. US government agency which regulates radio communications.

**FR**

Full Rate, speech coding.

**Flip open**

Used in this document to refer to P990i when the flip is open.

**GGSN**

Gateway GPRS Support Node

## **GIF**

Graphics Interchange Format. Format for storing images which also supports animated images. Highly compressed by limiting the colour palette to 16 or 256 colours.

## **G-MIDI**

General MIDI. Specifies a minimum level of performance compatibility.

## **GPRS**

General Packet Radio Services.

## **GSM**

Global System for Mobile Communications. GSM is the world's most widely-used digital mobile phone system, now operating in over 160 countries around the world.

## **GSM 900**

The GSM system family includes GSM 900, GSM 1810 and GSM 1900. There are different phases of roll-out for the GSM system and GSM phones are either phase 1 or phase 2 compliant.

## **GSM 1810**

Also known as DCS 1810 or PCN, this is a GSM digital network working on a frequency of 1810 MHz. It is used in Europe and Asia-Pacific.

## **GSM 1900**

Also known as PCS. Refers to a GSM system running in the 1900MHz band. Used in the USA and Canada, for instance.

## **HR**

Half Rate, speech coding.

## **HSCSD**

High Speed Circuit Switched Data.

## **HTML**

HyperText Markup Language.

## **HTTP**

HyperText Transfer Protocol.

## **IMAP4**

Internet Message Access Protocol version 4. Used to collect email from a mail server. Has more features than POP3.

## **iMelody**

A format for monophonic ringtones.

## **IrDA**

Infrared Data Association.

## **ISDN**

Integrated Services Digital Network. Can provide circuit-switched data connections in multiples of 64 Kbps.

## **ISP**

Internet Service Provider.

## **J2ME™**

Java2™ Micro Edition - an edition of the Sun Microsystems Java programming/runtime environment specifying two runtime environment 'configurations' aimed at small devices.

## **Java™ Phone**

An API in Java™ used for interacting with a phone.

## **JFIF**

JPEG File Interchange Format

## **JNI™**

Java™ Native Interface

## **JPEG**

Joint Photographic Experts Group, best known for the .JPG format for still image compression.

## **JVM™**

Java™ Virtual Machine

## **Kbps**

Kilobits per second - rate of data flow.

## **KVM**

'Kilo' Virtual Machine

## **LAN**

Local Area Network.

## **MAC Address**

Media Access Control address. This is a hardware address that uniquely identifies each node, such as a WLAN device, on a network. The P990i MAC address is printed on its label and is accessible through the WLAN set-up screen.

## **MBM**

Multi Bitmap. Image file format on Symbian OS.

## **ME**

Mobile Equipment. (Phone excluding SIM card)

## **MeT**

Mobile Electronic Transactions. An initiative founded by Ericsson, Nokia and Motorola to establish a secure and consistent framework for mobile transactions.

## **MIDI**

Musical Instrument Digital Interface. MIDI defines a protocol and file format which enables music to be described and stored in binary form.

## **MIDP**

Mobile Information Device Profile. An API (or 'profile' in J2ME nomenclature) defined to enable a standard programming API for mobile devices. MIDP compliant applications execute in the restricted environment defined by the CLDC.

## **MIME**

Multipurpose Internet Mail Extensions. A protocol defining how messages are sent on the Internet. MIME is used to describe how attachments are encoded and what type of data they contain.

## **MMS**

Multimedia Messaging Service. Logical extension of SMS and EMS, MMS defines a service enabling sound, images and video to be combined into multimedia messages.

## **MMS-C**

MMS Service Centre

## **MO**

Mobile Origination. Such as, an SMS message sent from a mobile terminal.

## **MP3**

MPEG Audio Layer 3. An audio compression technology that is part of MPEG-1 and MPEG-2 specifications. Commonly used to distribute music on the Internet and on portable players.

## **MPEG**

Moving Picture Experts Group. A working group of ISO/IEC in charge of the development of standards for coded representation of digital audio and video.

## **MS**

Mobile Station. (Phone and SIM card)

## **MT**

Mobile Termination.

## **OS**

Operating System, such as Symbian OS, Linux, Microsoft® Windows®.

## **OTA**

Over-the Air Configuration. To provide settings for the phone by way of sending a message, SMS, over the network to the phone. This reduces the need for the user to configure the phone manually.

## **PC**

Personal Computer.

## **PCS**

Personal Communications Services, often used to describe GSM1900 networks.

## **PDA**

Personal Digital Assistant. A handheld computer having functions such as address book, calendar etc.

## **PDF**

Portable Document Format. A format created by Adobe for storing and distributing documents.

**PDP**

Packet Data Protocol.

**Personal Java™**

An edition of Java™ appropriate for mobile devices such as PDAs.

**Phone book**

A memory in the SIM card where phone numbers can be stored and accessed by name or position.

**PIM**

Personal Information Management. Generic term for applications such as Contacts, Calendar, Tasks etc.

**PKI**

Public Key Infrastructure.

**PNG**

Portable Network Graphics. Format for storing images on file with data compression but without lowering of quality (loss of information).

**Polyphonic**

'Many sounds'. The maximum number of notes an instrument can play at the same time, commonly 16 in MIDI devices.

**POP3**

Post Office Protocol. Used to collect email from a mail server.

**PSTN**

Public Switched Telephone Network, such as, ordinary analogue phone line for speech and/or computer modem.

**PTD**

Personal Trusted Device. Concept in MeT

**QCIF**

Quarter Common Intermediate Format. A video format size of 176 x 144 lines.

**QQVGA**

Quarter Quarter VGA, 160 x 120 pixels.

**QVGA**

Quarter VGA size, typically refers to a portrait oriented screen 240 pixels wide x 320 pixels high.

**RADIUS**

Remote Access Dial-In Service. Facility at the ISP or corporation to manage remote data connections.

**RAS**

Remote Access Service.

**RMF**

Rich Music Format A™. file format developed by Beatnik combining the compact size of MIDI files with the high quality of MP3 and WAV.

**Rx**

Receive

**SC**

Service Centre (for SMS).

**SDK**

Software Development Kit

**Service Provider**

A company that provides services and subscriptions to mobile phone users.

**SIM card**

Subscriber Identity Module card - a card that must be inserted in any GSM-based mobile terminal. It contains subscriber details, security information and memory for a personal directory of numbers. The card can be a small plug-in type or credit card-sized, but both types have the same functions. P990i uses the small plug-in card.

**SIM-AT**

SIM Application Toolkit - a means of providing simple applications that are stored on the SIM card.

**SMIL**

Synchronized Multimedia Integration Language. Used by MMS to describe how media objects are to be played.

## **SMS**

Short Message Service. Allows messages of up to 160 characters to be sent and received via the network operator's message centre to a mobile phone.

## **SMSCB**

SMS Cell Broadcast.

## **SMTP**

Simple Mail Transfer Protocol. Protocol used to send email from an email client via an SMTP server.

## **SS**

Supplementary Service

## **SSID**

Service Set Identifier, a 32-character unique identifier attached to the header of packets sent over a WLAN that acts as an identifier when a mobile device tries to connect to the BSS. An SSID is also referred to as a network name because essentially it is a name that identifies a wireless network.

The SSID differentiates one WLAN from another, so all devices attempting to connect to a specific WLAN must use the same SSID. A device will not be permitted to join the BSS unless it can provide its unique SSID. Because an SSID is present as plain text in the packets, it does not supply any security to the network.

## **SWIM**

A SWIM card is a SIM card containing a WIM

## **T9**

(Text on 9 Keys) A text input system from Tegic that adds intelligence to multi-tapping letters on a telephone keypad.

## **TCP/IP**

Transmission Control Protocol/Internet Protocol.

## **TE**

Terminal Equipment. Generic term for GSM terminals such as phones and PC cards.

## **Terminal Adaptor**

Generic term for the equipment terminating a digital communications line such as an ISDN2 line. P990i is a Terminal Adaptor since it interfaces to GSM digital data services.

## **TLS**

Transport Layer Security. As used by Web browsers.

## **Tx**

Transmit

## **TTY (Teletypewriter)**

A telecommunication device with a keyboard and a visual display that is used primarily by people who are deaf, hard of hearing, or have a speech disability.

## **UI**

User Interface. Sometimes called 'Man-Machine Interface'.

## **UIQ**

A customizable pen-based user interface for media-rich mobile phones that is based on the Symbian OS. It may be used as the basis for building an attractive and efficient UI.

## **URL**

Uniform Resource Locator. Points to a service or information on the Internet.

## **USSD**

Unstructured Supplementary Services Data. Narrow-band GSM data service. An example is, entering \*79\*1234# might return the stock price for stock 1234.

## **V.110**

ETSI standard for data over an ISDN circuit.

## **V.120**

ETSI standard for data over an ISDN circuit.

**vCal; vCalendar**

vCalendar defines a transport and platform-independent format for exchanging calendar and scheduling information for use in PIMs/PDAs and group schedulers. vCalendar is specified by IETF.

**vCard**

vCard automates the exchange of personal information typically found on a traditional business card, for use in applications such as Internet mail, voicemail, Web browsers, telephony applications, call centres, video conferencing, PIMs /PDAs, pagers, fax, office equipment, and smart cards. vCard is specified by IETF.

**VGA**

Video Graphics Array. Graphics standard introduced by IBM, having a resolution of 640 x 480 pixels.

**VPN**

Virtual Private Network.

**WAP**

Wireless Application Protocol. Handheld devices, low bandwidth, binary coded, a deck/card metaphor to specify a service. A card is typically a unit of interaction with the user, that is, either presentation of information or request for information from the user. A collection of cards is called a deck, which usually constitutes a service.

**WAV**

Waveform audio. Format for storing sound.

**WBMP**

Wireless BitMap. Part of the WAP specifications, an image format optimized for small mobile devices.

**WBXML**

Wireless Binary Extensible Markup Language.

**WEP**

Wired Equivalent Privacy, a security protocol for WLAN defined in the 802.11b standard. WEP is designed to provide the same level of security as that of a wired LAN. WLANs, which are connected through a radio link, are more vulnerable to unau-

thorized access than a LAN. WEP provides security by encrypting the data that is to be passed over the radio link.

**Wi-Fi**

Wireless fidelity is a de facto standard certified by the Wireless Ethernet Compatibility Alliance (WECA) allowing a WLAN to operate with other WLAN systems. Wi-Fi is sometimes used to refer to WLAN in general.

**WIM**

Wireless Identity Module.

**WLAN Ad Hoc Mode**

An 802.11 networking framework in which devices communicate directly with each other, without the use of an access point (AP). Ad-hoc mode is useful for establishing a network where wireless infrastructure does not exist or where services are not required.

**WLAN Infrastructure Mode**

An 802.11 networking framework in which devices communicate with each other by first going through an Access Point (AP). Most corporate wireless LANs operate in infrastructure mode because they require access to the wired LAN in order to use services such as file servers or printers. When one AP is connected to a wired network and a set of WLAN devices it is referred to as a Basic Service Set (BSS). An Extended Service Set (ESS) is a set of two or more BSS that form a single subnetwork.

**WML**

Wireless Markup Language. A mark-up language used for authoring services, fulfilling the same purpose as HyperText Markup Language (HTML) does on the World Wide Web (WWW). In contrast to HTML, WML is designed to fit small handheld devices.

**WPA and WPA2**

Wi-Fi Protected Access, a Wi-Fi standard that was designed to improve upon the security features of WEP. The technology is designed to work with existing Wi-Fi products that have been enabled with WEP, such as, a software upgrade to existing hardware. The technology includes two improvements over WEP:



- Improved data encryption through the temporal key integrity protocol (TKIP). TKIP scrambles the keys using a hashing algorithm and, by adding an integrity-checking feature, ensures that the keys haven't been tampered with.
- User authentication, which is generally missing in WEP, through the extensible authentication protocol (EAP). EAP is built on a secure public-key encryption system to ensure that only authorized network users can access the network.

It should be noted that WPA is an interim standard that is being replaced with WPA2 that is virtually identical with the IEEE 802.11i standard.

## WTLS

Wireless Transport Layer Security. Part of WAP, WTLS provides privacy, data integrity and authentication on transport layer level between two applications.

## XHTML

Extensible Hypertext Markup Language

## XML

Extensible Markup Language

# Related information

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## Documents

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- The P990i User Guide.
- Sony Ericsson P990i FAQ.
- AT Command Reference Manual.
- WAP 2.0 Specifications.

## Links

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- [www.SonyEricsson.com](http://www.SonyEricsson.com)
- [www.SonyEricsson.com/fun/](http://www.SonyEricsson.com/fun/)
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